This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

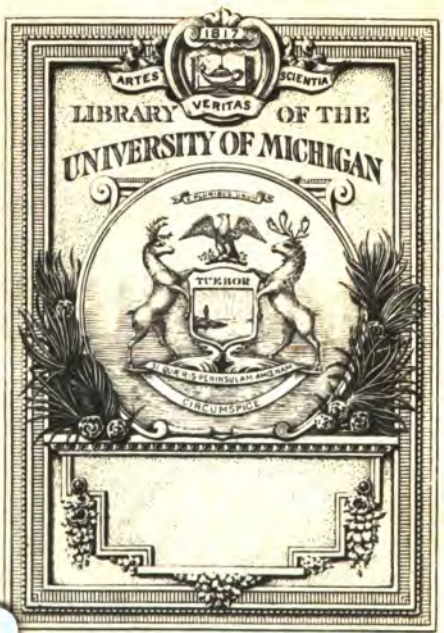
+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

A.

1828


1817
ARTES
VERITAS
SCIENTIA
LIBRARY OF THE
UNIVERSITY OF MICHIGAN
TUEBOR
CIRCUMSPICE

QA
101
.W266
1828

Cool - 100 w

9/12

50
31

Wm Haynes

MERCANTILE ARITHMETIC,

ADAPTED TO THE

COMMERCE OF THE UNITED STATES,

IN

ITS DOMESTIC AND FOREIGN RELATIONS,

WITH AN APPENDIX,

CONTAINING

PRACTICAL SYSTEMS

ON

MENSURATION, GAUGING,

AND

BOOK-KEEPING.

A NEW EDITION, REVISED AND IMPROVED.

BY MICHAEL WALSH.

Boston:

PUBLISHED BY RICHARDSON AND LORD.

No. 133, Washington Street.

1828.

DISTRICT OF MASSACHUSETTS—TO WIT:

District Clerk's Office.

BE IT REMEMBERED, That on the twenty-seventh day of September, A. D. 1826, in the fifty-first year of the Independence of the United States of America, MICHAEL WALSH, of the said District, has deposited in this Office the Title of a Book, the Right whereof he claims as Proprietor, in the words following, to wit:

"The Mercantile Arithmetic, adapted to the commerce of the United States, in its Domestic and Foreign Relations, with an Appendix, containing Practical Systems of Mensuration, Gauging, and Book-keeping. A new edition, revised and improved, by Michael Walsh."

In conformity to the Act of the Congress of the United States, entitled, "An Act for the Encouragement of Learning, by securing the Copies of Maps, Charts and Books, to the Authors and Proprietors of such copies, during the times therein mentioned:" and also to an Act entitled, "An Act supplementary to an Act, entitled, An Act for the encouragement of Learning, by securing the copies of Maps, Charts and Books, to the Authors and Proprietors of such copies during the times therein mentioned; and extending the benefits thereof to the Arts of Designing, Engraving and Etching Historical and other Prints."

JOHN W. DAVIS,
Clerk of the District of Massachusetts.

Wm Haynes

Hist. Soc. Coll. ... 120 24

PREFACE.

The MERCANTILE ARITHMETIC has had greater success and a more extensive circulation than the author anticipated. And although he has not been concerned in revising or improving it, since the first edition was printed, and only slight alterations have been made by other hands, it is still regarded by many as a very useful work. He hopes that now, corrected and improved, it will continue to be a convenient manual for merchants and others, engaged in trade, and that pupils, who are preparing for business, by thoroughly learning it, will acquire a readiness and accuracy in mercantile calculations, in which, persons, learned in other respects, are frequently deficient. As it is intended to be very practical, and adapted to the concerns of trade and commerce, by conveying a general knowledge of accounts and exchange, the numerous examples and exercises have been chiefly taken from actual occurrences.

Every one is bound by his duty to himself and others, to keep accounts; and in order to this, he must have some acquaintance with the systems of arrangement and method which have been divised by experience. Irregular memoranda are, from the difficulty of reference, almost useless. This consideration has led him to give a general outline of Book-keeping, comprehending, in his view, the necessary principles, in so plain a manner, that any one, by careful attention, may understand the true theory of accounts, and apply the principles to practice without much hesitation or difficulty. Convinced that no one need be at a loss to keep

clear and satisfactory accounts, who has a just idea of the nature of the subject, he has endeavoured to explain it with all possible precision and simplicity. This part of the work is entirely new, and he hopes, *the manner of arrangement* will attach a particular value to it. The different forms used by merchants are as various, as the demands of their business; but as all are reducible to the great principle of classing the several transactions under suitable heads, in such a way, that the state of one's property or business may be easily examined and known, this compendium may be a safe guide for a person of discernment to follow in any circumstances.

Nothing need be said of the propriety of the brief tracts of practical Mensuration and Gauging, which are annexed to the work. Such knowledge is as important and requisite, as most rules of arithmetic, and what is inserted is adapted to common purposes.

As the work is now under the author's control, he trusts that in future editions it will be more and more improved with whatever may occur, as conducive to its original design of rendering mercantile calculations easy and familiar. In schools it may be studied in connexion with the popular treatises of mental Arithmetic, or as a sequel to them, as will best suit the views of instructers.

Thos Haynes

CONTENTS.

Numeration	13
Simple Addition	15
Subtraction	16
Multiplication	17
Division	21
Practical Questions in Federal Money	26
Miscellaneous Questions	28
Tables of Money, Weights, Measures, &c.	29
Compound Addition	32
Compound Subtraction	35
Practical Questions in Compound Addition and Subtraction	37
Reduction	39
To find the contents of grindstones	41
To find the weight of grindstones by the dimensions	42
American Currencies	42
A Table for reducing shillings and pence of the different currencies to cents and mills	50
Compound Multiplication	50
Bills of Parcels	55
Compound Division	57
Decimal Fractions	60
Single Rule of Three Direct	67
Inverse Proportion	73
Compound Proportion	74
Vulgar Fractions	77
Practice	89
Tare and Tret	94
Single Fellowship	96
Double Fellowship	97
Simple Interest	98
Mode of calculating the interest of notes with endorsements, and settlement within a year from the date or commencement of interest	103
Interest Account	104
Rule established by the Courts of Law of Massachusetts for making up judgments on securities for money, which are upon interest, and on which partial payments have been endorsed	105
A statement in which the interest and principal are kept more distinctly separate	106
Recapitulation of the same example	107
Statement shewing how the Massachusetts and Connecticut Court Rules of calculating interest differ	107
Compound Interest	108
Table shewing the amount of one pound or one dollar for any number of years under 33, at the rates of 5 and 6 per cent. per annum, compound interest	109
Commission and Brokerage	109

To invest or purchase so as to reserve the commission, or net to over[illegible] net proceeds 110
Insuranc[illegible] 111
Directions [illegible]hip-Masters 113
Average 117
Freight 119
An estimate of the quantity of certain goods calculated to make a ton in freight 121
Primage 122
Buying and selling Stocks 122
Discount 123
To raise the price of goods so as to discount without loss . 125
Bank Discount 126
Equation of Payments 126
Barter 128
Loss and Gain 130
Alligation Medial 131
Alligation Alternate 132
Single Position 134
Double Position 135
Arithmetical Progression 137
Geometrical Progression 139
Permutation 142
Extraction of the Square Root 142
To find the area of a piece of land in form of a triangle . . 146
To find the area of any irregular four or five sided piece . 147
Extraction of the Cube Root 147
Extraction of the Biquadrate Root 150
General Rule for extracting the Roots of all Powers . . 150
Duodecimals 151
To find the contents of Bales, Cases, &c. in order to ascertain the freight 153
To find Ships' Tonnage by Carpenters' Measure 154
To find the Government Tonnage of Ships 155
Tables of Cordage 157
Table shewing the weight of Iron Cables, &c. 159
A Table shewing the number of miles contained in a degree of longitude in each parallel of latitude from the Equator to the Poles, and its use 159
To find the bearing of one place from another by Arithmetic 161
Table of Angles, for every Point and Quarter Point . . 163
To Reduce Longitude to time 163
To Reduce Time to Longitude 164
To find the part of the globe opposite to a given place . . 165
To estimate distance of objects at sea 165
To find the daily and hourly velocity of the motion of the planets in their orbits 166
Miscellaneous Questions 167
Observations on Exchange 175
Fineness of Silver and Gold in the United States . . . 175
Exchange with Great Britain 176

A Table for reducing Sterling to Federal Money at par . 179
Exchange with Ireland 180
Hamburgh 180
Holland 181
Antwerp 182
Bremen 185
Denmark 185
Sweden 185
Stettin 187
Russia 187
Riga 188
France 188
Marseilles 189
Spain 190
Cadiz 191
Bilboa 192
Alicant and Barcelona 192
Portugal 192
Leghorn 194
Naples 194
Trieste 195
Genoa 195
Palermo 196
Venice 196
Malta 197
Smyrna 197
Commerce of Smyrna from the Oriental Herald 200
Calcutta 204
Bombay 208
Madras 209
Java 209
Canton 210
Manilla 212
Columbo, Isle of Ceylon 213
Japan 213
Jamaica and Bermudas 214
Barbadoes 215
Martinico 215
Guadaloupe 215
Cuba 215
Porto Rico 217
St. Thomas 217
St. Martins 217
St. Eustatia 218
Rio Janeiro 218
Arbitration of Exchange 219
Mode of calculating American Duties 221
Table for finding the value of the gold coins of Great Britain, Portugal, France and Spain 224
Mensuration 225
Gauging 232

EXPLANATION

OF THE

CHARACTERS USED IN THIS WORK.

= SIGNIFIES equality, or equal to: as 20 shillings = one pound: that is, 20 shillings are equal to 1 pound.

+ Signifies more, or Addition: as, 6+6=12: that is, 6 added to 6 is equal to 12.

— Signifies less or Subtraction: as, 6—2=4: that is, 6 less 2 is equal to 4.

× Signifies Multiplication: as 6×2=12: that is, 6 multiplied by 2 is equal to 12.

÷ Signifies Division: as, 6÷2=3: that is, 6 divided by 2 is equal to 3.

Division is sometimes expressed by placing the numbers like a fraction, the upper figures being the dividend, and the lower the divisor: thus, $\frac{54}{6}=9$: that is, 54 divided by 6 is equal to 9.

: : : : Proportion: as 3 : 6 : : 9 : 18; that is, as 3 is to 6, so is 9 to 18.

$\surd$ Prefixed to any number, signifies that the square root of that number is required.

A line or vinculum, drawn over several numbers, signifies, that the numbers under it are to be considered *jointly*, as $8-\overline{3+4}=1$; but without the line, $8-3+4=9$.

MERCANTILE ARITHMETIC.

ARITHMETIC is the art of computing by numbers, and has five principal rules for this purpose, viz. *Numeration*, *Addition*, *Subtraction*, *Multiplication*, and *Division*.

NUMERATION

Teacheth to express any proposed number by these ten characters, 0. 1. 2. 3. 4. 5. 6. 7. 8. 9.—0 is called a cipher and the rest, figures or digits. The relative value of which depends upon the place they stand in, when joined together, beginning at the right hand as in the following

TABLE.

hundreds of millions.	tens of millions.	millions.	hundreds of thousands.	tens of thousands.	thousands.	hundreds.	tens.	units.
9	8	7	6	5	4	3	2	1

Though the table consists of only nine places, yet it may be extended to more places at pleasure; as, after hundreds of millions, read thousands of millions, ten thousands of mil-

lions, hundred thousands of millions, billions, &c. as in the following example.

Periods.	Quadrill.		Trillions.		Billions.		Millions.		Units.	
Half-per.	th.	un.	th.	un.	th.	un.	th.	un.	c.x.t.	c.x.u.
Figures.	123,	456.	789,	098.	765,	432.	101,	234.	567,	890.

TO WRITE NUMBERS.

Rule. Write down the figures as their values are expressed, and supply any deficiency in the order with ciphers.

Examples.

Write down in proper figures the following numbers.

Twenty-nine.
Two hundred and forty-seven.
Seven thousand nine hundred and one.
Eighty-four thousand three hundred and twenty-nine.
Nine hundred and two thousand six hundred and fifteen.
Eighty-nine millions and ninety.
Four millions four hundred thousand and forty.
Nine hundred and nine millions nine hundred and ninety.
Seventy millions seventy thousand and seventy.

Eleven thousand eleven hundred and eleven.

eleven thousand	11000
eleven hundred	1100
eleven - - -	11
Total	12111

Fourteen thousand fourteen hundred and fourteen.

fourteen thousand	14000
fourteen hundred -	1400
fourteen - - -	14
Total	15414

To express in words any number proposed in figures.

Rule. To the simple value of each figure, join the name of its place, beginning at the left hand, and reading towards the right.

Examples.

Write down in words the following numbers.

46, 199, 2267, 86693, 289732, 11911911.
1169990, 9919, 7114320, 3155000510, 1375684001957.

SIMPLE ADDITION

Teacheth to collect numbers of the same denomination into one sum.

Rule. Place the numbers under each other so that units may stand under units, tens under tens, and so on, and draw a line under them.

Add the first row or right hand column, and find how many tens are contained in them —Set down the remainder, and carry as many units or ones to the next column, as there are tens. In like manner carry the tens of each column, till the whole be finished.

Proof. The mercantile method of proving addition is to reckon downwards as well as upwards, or to divide the sum to be added into several divisions or parcels, add these separately, and then add their sums together.—If the amount of these be the same as the amount obtained by adding at once, it may be presumed the true amount is obtained.

Examples.

2	22	2345	6784	67491
6	33	2345	2936	14373
4	44	4352	8291	26852
5	55	5432	4174	17473
6	66	6625	3259	91568
23	220	21099		

Add the following sums, viz.

76389. 576. 8799. 532. 7. 900. 45913 and 19, together.

76389
576
8799
532
7
900
45913
19

6741. 86. 95310. 15. 10019. 571. 26. and 7993, together.

6741
86
95310
15
10019
571
26
7993

Add the following numbers, viz.

1.2.3 4.5.6.7.8 and 9 together. Ans. 45
9.8.7.6.5.4.3.2 . . 1 45
5.6.7.9.8.6.3.5.4 . . 2 55
6.7.9.3.4.9.6.7.4 . . 8 63
8.4.7.6.9.4.3.9.7 . . 6 63
7.3.8.4.7.9.5.6.8.5 . . 4 66
6.9.5.4.8.6.3.9.9.8.6 . . 9 82
9.6.8.9.9.3.6.8.4.5.9 . . 6 82
7.8.9.4.5.6.8.9.9.7.7.3 . . 4 86
4.3.7.7.9.9.8.6.5.4.9.8 . . 7 86
8.7.4.9.5.2.1.7.9.8.3.6.2 . . 9 80
9.2.6.3.8.9.7.1.2.5.9.4.7 . . 8 80
5.6.5.8.9.3.7.4.9.8.7.5.6.3.7.9.9.8.7.4 . . 6 135
7.3.9.5.8.5.6.9.4.8.6.5.7.9.3.7.7.8.9.6 . . 4 135

SIMPLE SUBTRACTION

Teacheth to take a less number from a greater of the same denomination, and thereby show the difference.

The greater is called the *minuend*, and the less the *subtrahend.*

Rule. Place the subtrahend or less number, under the minuend or greater, and subtract units from units, tens from tens, and so on. If any figure of the subtrahend be greater than the corresponding one of the minuend, borrow ten; that is, add ten to the upper figure, and then subtract the lower from the sum, set down the remainder, and carry one to the next figure of the subtrahend.

Proof. Add the remainder to the subtrahend, and if the sum is equal to the minuend, the work is right.

Examples.

Minuend	5678943	56474	67143
Subtrahend	1354732	13845	41872
Remainder	4324211	42629	25271
Proof	5678943	56474	67143

From	467328	6105413	864175
take	179814	2714825	373196
Difference	287514		
Proof	467328		
From	510700930	51901146	601191005
take	170910742	29700913	110910930
Difference	339790188		
Proof	510700930		

SIMPLE MULTIPLICATION

Is a compendious way of adding numbers of the same name. The number to be multiplied is called the *multiplicand*. The number which multiplies is called the *multiplier*. The number arising from the operation is called the *product*.

MULTIPLICATION TABLE.

1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	32	36	40	44	48
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

RULE. Place the multiplier under the multiplicand and multiply the latter successively by the significant figures of the former; if the multiplier consist of more figures than

one, place the right hand figure of each product under the figure from which it arises; then add the several products, and their sum is the product of both factors, and the answer required.

EXAMPLES.

76432	76432	76432	76432
2	3	4	5
152864	229296	305728	382160

76432	76432
2345	5432
382160	152864
305728.	229296.
229296..	305728..
152864...	382160...
179233040	415178624

67893	67893	67893	67893
6	7	8	9
407358	475251	543144	611037

67893	39876
98060	60709
4073580	358884
5431440*.	2791320.
611037....	2392560...
6657587580	2420832084

* Writing a cipher under the cipher in the multiplier preserves its local value in the product, and prevents an error in placing the next figure.

632951	560932	678057	6096874
10	12	20	7000
6329510	6731184	13561140	42678118000

1.	Multiply	8763513 by 1	product	8763513
2.	. . . . .	3765434 2	. . . . .	7530868
3.	. . . . .	2719876 3	. . . . .	8159628
4.	. . . . .	5741967 4	. . . . .	22967868
			Sum of products	47421877
5.	Multiply	7189205 by 5	product	35946025
6.	. . . . .	8197591 6	. . . . .	49185546
7.	. . . . .	5787914 7	. . . . .	40515398
8.	. . . . .	2678719 8	. . . . .	21429752
			Sum of products	147076721
9.	Multiply	591873 by 9	product	5326857
10.	. . . . .	598935 10	. . . . .	5989350
11.	. . . . .	219674 11	. . . . .	2416414
			Sum of products	13732621
12.	. . . . .	906897 by 12	. . . .	10882764
13.	. . . . .	795384 20	. . . .	15907680
14.	. . . . .	389157 700	. . . .	272409900
			Sum of products	299200344

Multiply	968753	or thus	968753	
by	7953		7000	
	2906259		6781271000	product by 7000
	4843765.		.871877700	. . 900
	8718777..		..48437650	. . 50
	6781271...		...2906259	. . 3
product	7704492609		7704492609	

Multiply		675084	Multiply		875039
by	7 product	4725588	by	12 product	10500468
	8 . .			300 . .	
	9 . .			540 . .	
	10 . .			2609 . .	
	11 . .			75070 . .	
	12 . .			78 . .	
	20 . .			1390 . .	
Sum of products		51981468	Sum of products		70002244961

When the multiplier is 10, 100, 1000, &c. the product is found by annexing the ciphers to the multiplicand for the answer. In this way, dollars may be reduced to cents and mills, and if there be cents, or cents and mills, annexed to the dollars, remove the separating point or points—and read the whole for the answer, in the same name with the lowest denomination mentioned.

EXAMPLES.

In 513 dollars of 100 cents each, how many cents?
Ans. 51300 cents.

How many mills in 871 dollars of 1000 mills each?
Ans. 871000 mills.

In $147,53 cts. how many cents? Ans. 14753 cents.

In 814 dols. 37 cts. 8 mills, how many mills?
Ans. 814378 mills.

To multiply by fractions, or parts of an unit.

RULE. Multiply the given number by the numerator, or upper figure of the fraction, and divide the product by the denominator or lower figure for the answer.

EXAMPLES.

How much is $\frac{3}{8}$ of 584.

584
3 numerator.
denom. 8)1752
Ans. 219

How much is $\frac{7}{16}$ of 480.

480
7
16)3360
Ans. 210

SIMPLE DIVISION

Teacheth to find how often one number is contained in another of the same name.

The number to be divided, is called the *dividend.*

The number by which to divide, is called the *divisor.*

The number of times the divisor is contained in the dividend is called the *quotient.*

The *remainder*, if there be any, will be less than the divisor.

RULE. On the right and left of the dividend draw a curved line, and write the divisor on the left hand, and the quotient as it arises on the right.

Find how many times the divisor is contained in as many figures of the dividend, as are necessary, and write the number in the quotient.

Multiply the divisor by the quotient figure, and set the product under that part of the dividend used.

Subtract the product, last found, from that part of the dividend under which it is placed, and to the right hand of the remainder bring down the next figure of the dividend; divide this number as before, and so on, till the whole is finished—If it be necessary to bring down more figures than one to the remainder, in order to make it as large as the divisor, a cipher must be written in the quotient for every figure so brought down, till the number be sufficient to contain the divisor.

PROOF. Multiply the quotient by the divisor, and to the product add the remainder, and the sum will be equal to the dividend, if the work be right.

When there are ciphers annexed to the divisor, cut off the ciphers from it, and the same number of digits from the dividend, then divide the remaining figures by each other, as usual, the quotient is the answer, and what remains, placed before the figures cut off, is the true remainder.

When the divisor does not exceed 12, or is a composite number, or when ciphers may be cut off from it, the division may be shortened by multiplying and dividing mentally, and writing the quotient under the dividend.

EXAMPLES.

1)6759384	2)4684628	3)9363639
6759384	2342314	3121213

2)153	3)197	4)267	5)287	7)348	9)654
76–1 rem.	65–2	66–3	57–2	49–5	72–6

12)2687	2,0)567,4	4,00)675,62	8,00)255,74
223–11 rem.	283–14	168–362	31–774

	Quotient.
43)366892(	8532
344	
228	
215	
139	
129	
102	
86	
16 rem.	

	Quotient.	
31,00)7948,35(	256	
62	3100	
174	25600	
155	768...	
198	1235	
186	794835	proof.
1235 rem.		

When the divisor is large, a table may be formed of the products of the nine digits, (either by multiplying or successively adding) by which, the quotient figures to the several dividends, may be readily found, thus,

Divisor.	*Dividend.*	*Quotient.*
3956)	34585539543(	8742552
	31648	3956
	29375	52455312
	27692	43712760.
		78682968..
The Table.	16833	26227656...
3956 by 2= 7912	15824	3831
3=11868		
4=15824	10099	Proof 34585539543
5=19780	7912	
6=23736		
7=27692	21875	
8=31648	19780	
9=35604		
	20954	
	19780	
	11743	
	7912	
	3831 remainder.	

				Quotients.	*Rem'rs.*
1.	Divide	450[illegible]	by 1	4507109	0
2.		7[illegible]	2	3843633	1
3.		[illegible]	3	2906625	0
4.		[illegible]	4	671786	2
5.		60019	5	352003	4
6.		109173	6	351528	5

				Quotients.	*Rem'rs.*
7.	Divide	576973	by 7	82424	5
8.		867918	9	96435	3
9.		170038	10	17003	8
10.		376859	11	34259	10
11.		291005	12	24250	5
12.		1876719	20	93835	19
13.		2326174	600	3876	574

14.	Divide	8917653	by	16	557355	and 5 rem'g.
15.		1711190		19	90062	12
16.		2687132		25	107485	7
17.		1191009		39	30538	27
18.		2711193		79	34318	71
19.		1896371		119	15935	106
20.	Divide	1191467	by	57	20902	and 53 rem'g.
21.		3182952		87	36585	57
22.		1198714		396	3027	22
23.		2019126		1918	1052	1390
24.		1091462		5939	183	4625
25.	Divide	1765391	by	180	9807	and 131 rem'g.
26.		7149533		5700	1254	1733
27.		6100587		9300	655	9087
28.		1910051		6400	298	2851
29.		9991872		89000	112	23872

When the divisor is a composite number, that is, if any two figures, being multiplied together, will make that number, then divide the dividend by one of those figures, and the first quotient by the other figure, and it will then give the quotient required.—But as it sometimes happens that there is a remainder to each of the quotients, and neither of them the true one, it may be found by this

RULE. Multiply the first di[illegible] the last remainder, and to the product add the firs[illegible], which will give the true one.

EXAMPLES.

Divide 296876234 by 64.

8)296876234

8)37109529—2

Quotient 4638691 and 1×8+2=10 remaining.

Divide 8757635 by 28. Quotient 312772 and 19 rem.

Divide 18957492 by 42. Quotient 451368 and 36 rem.

When the price of a ton or 2240 lbs. of Old Sable iron is $112, how much is it per lb.?

$2240 = 40 \times 8 \times 7$

40)11200
8)280
7)35

or, 2240)11200(5 cents.
11200

Ans. 5 cents.

To divide by mixed numbers, or a whole number and a fraction.

Rule. Reduce the divisor and dividend into the same name, and divide as usual, if there is a remainder, reduce it to its value in integers.

Examples.

In 346½ yards how many perches of 5½ yards each?

5½ × 2 = 11
346½ × 2 = 693
693 ÷ 11 = 63

Ans. 63 perches.

How many perches or poles of 16½ feet each in 1790¼ feet?

16½ × 4 = 66
1790¼ × 4 = 7161
7161 ÷ 66 = 108, remainder 561
528
4)33 quarters.
8¼

Ans. 108 per. and 8¼ feet.

When the divisor is 10, 100, 1000, &c. the figures of the dividend, that remain after pointing, give the quotient or answer without dividing, and in this way, mills and cents

are reduced to dollars, by pointing off in the dividend for the ciphers in the divisor, for dollars.

EXAMPLES.

In 16875 mills how many dollars of 1000 mills each?

1,000)16,875

Ans. $16,87 cts. 5 mills.

In 18768 cents how many dollars of 100 cents each?

1,00)187,68

Ans. $187,68 cents.

PRACTICAL QUESTIONS IN FEDERAL MONEY.

1. How much will 1875 lbs. amount to at 9 mills per lb.?

1875
9

16875 mills.

Ans. $16,87 cts. 5 mills.

2. At 12 cents per lb. how much will 1564 lbs. of sugar come to?

1564
12

18768.

Ans. $187,68 cents.

3. What will 57 barrels of flour come to at $5 per barrel?

57
5

Ans. $285.

4. How much will 12 yards of cloth come to at $5,37 cts. per yard?

5,37
12

Ans. $64,44 cents.

5. 976 lbs. of pepper at $17\frac{3}{4}$ cents per lb.

976
$17\frac{3}{4}$

6832
976
488 at $\frac{1}{2}$ cent.
244 at $\frac{1}{4}$ cent.

17324 cents.

Or thus,

9760 at 10 cents.
6832 7 "
488 $\frac{1}{2}$ "
244 $\frac{1}{4}$ "

Ans. $173,24 cents.

6. 874 lbs. at $4\frac{1}{2}$ cents per lb.

874
4

3496 at 4 cents.
437 at $\frac{1}{2}$ cent.

Ans. $39,33 cents.

7. $46\frac{1}{4}$ yards at 28 cents.

46
28

368
92
$\frac{1}{4}$ of 28 7

Ans. $12,95 cents.

8. $57\frac{1}{2}$ yards at 36 cents.

57
36

342
171
$\frac{1}{2}$ of 36 18

Ans. $20,70 cents.

9. $96\frac{3}{4}$ yards at $248 per yard.

248
96

1488
2232
$\frac{1}{2}$ yard 124
$\frac{1}{4}$ yard 62

Ans. $239,94 cents.

10. What will 2352 lbs. of white sugar come to at $13\frac{1}{8}$ cents per lb.

2352
13

30576
At $\frac{2}{8}$ or $\frac{1}{4}$ ct. 588
$\frac{1}{8}$ 294

Ans. $314,58 cents.

Or thus,

23520 at 10 cents.
7056 " 3
588 " $\frac{2}{8}$
294 " $\frac{1}{8}$

$314,58

11. What is the freight of 205 hhds. of tobacco, weighing 279612 lbs. at $1\frac{1}{4}$ ct. per lb.

279612 at 1 ct. per lb.
69903 " $\frac{1}{4}$ "

Ans. $3495,15 cents.

12. What is the primage on $3495 freight, at 5 per cent?

3495 freight,
5 cents per $.

Ans. 174,75 cents.

13. What will 39584 lbs. of plaster of Paris come to at $4,50 per ton of 2240 lbs.

39584
$4\frac{1}{2}$

158336
19792

40)17812,8

$2240 = 40 \times 8 \times 7$ { 8)4453,2

7)556,65

Ans. $79,52

14. What is the amount of a cargo of lumber, measuring 23468 feet at $12,50 cents per thousand, equal to $12\frac{1}{2}$ mills per foot?

23468
$12\frac{1}{2}$

Lumber is reckoned at as many mills per foot, as there are dollars per thousand.

at 12 mills 281616
$\frac{1}{2}$ " 11734

293350 mills.

Ans. $293,35 cents.

MISCELLANEOUS QUESTIONS.

1. Add 562163, 21964, 56321, 18536, 4340, 279, and 83 together. Ans. 663686.

2. What number is it, which being added to 9709 will make 110901? Ans. 101192.

3. General WASHINGTON was born in the year 1732; and he died in 1799, What was his age? Ans. 68 years.

4. Add up twice 397, three times 794, four times 3176, five times 15880, six times 95280, and once 333040. Ans. One Million.

5. 128 men have one half of a prize, worth 34560 dollars, to be equally divided between them? What is each man's part? Ans. 135 dollars.

Prove this answer to be right.

6. Three merchants, A, B, and C, have a stock of 14876 dollars, of which A put in 4963 dollars, B 5188 dollars and C the remainder: How much did C put in?

Ans. 4725 dollars.

TABLE OF MONEY, WEIGHTS, MEASURES, &c.

FEDERAL MONEY.

10 Mills	make	1 Cent.
10 Cents		1 Dime.
10 Dimes, or 100 Cents		1 Dollar.
10 Dollars		1 Eagle.

ENGLISH MONEY.

4 Farthings	make	1 Penny.
12 Pence		1 Shilling.
20 Shillings		1 Pound.

TROY WEIGHT.

24 Grains	make	1 Pennyweight.
20 Pennyweights		1 Ounce.
12 Ounces		1 Pound.

NOTE. By this weight are weighed jewels, gold, silver, and liquors

The fineness of gold is generally expressed in carats. Thus any piece or quantity of it, is divided into 24 equal parts or carats, and the number of these remaining after it is assayed, shews its fineness.—As the imaginary unit of reference may be any weight, the carat of gold or silver therefore has no specific weight.

The diamond carat is 3½ grains Troy.*
5 pearl carats 4 " "

AVOIRDUPOIS WEIGHT.

16 Drams	make	1 Ounce.
16 Ounces		1 Pound.
28 Pounds		1 Quarter.
4 Quarters		1 Hundred weight.
20 Hundred weight		1 Ton.

NOTE. By this weight are weighed such commodities as are coarse and subject to waste, and all metals except gold and silver. One pound Avoirdupois "may be fairly taken at 7000 grains Troy."

*The largest diamond known is 1680 carats=12⅓ oz. making the carat 3½ grains. Its worth at the usual rate would be $25[illegible]000.

Apothecaries' Weight.

20	Grains	make	1 Scruple.
3	Scruples	make	1 Dram.
8	Drams	make	1 Ounce.
12	Ounces	make	1 Pound.

Note. Apothecaries use this weight in compounding their medicines; but they buy and sell their drugs by Avoirdupois weight.

Cloth Measure.

4	Nails	make	1 Quarter.
4	Quarters	make	1 Yard.
3	Quarters	make	1 Ell Flemish.
5	Quarters	make	1 Ell English.
6	Quarters	make	1 Ell French.

Long Measure.

3	Barely Corns	make	1 Inch.
12	Inches	make	1 Foot.
3	Feet	make	1 Yard.
5½	Yards, of 16½ feet	make	1 Pole, rod, or Perch.
40	Poles, or 220 yards	make	1 Furlong.
8	Furlongs	make	1 Mile.
3	Miles	make	1 League.
60	Geographical miles / 69½ Statute miles	make	1 Degree.

Note. In this measure, length only is considered.

Land or Square Measure.

144	Square Inches	make	1 Square Foot.
9	Feet	make	1 Yard.
30¼	Yards, or 272¼ Feet	make	1 Pole, Rod, or Perch.
40	Poles or Perches	make	1 Rood.
4	Roods	make	1 Acre.
640	Acres / 3097600 Square Yards	make	1 Mile.
605	Arpents in Louisiana	make	112 Acres.

Note. This measure respects length and breadth.

Wine Measure.

2	Pints	make	1 Quart.
4	Quarts	make	1 Gallon.
42	Gallons	make	1 Tierce.
63	Gallons	make	1 Hogshead.
84	Gallons	make	1 Puncheon.
2	Hogsheads	make	1 Pipe or Butt.
2	Pipes or 4 hogsheads	make	1 Tun.

Note. The wine gallon contains 231 cubic inches.

Ale and Beer Measure.

2	Pints	make	1 Quart.
4	Quarts		1 Gallon.
8	Gallons		1 Firkin of Ale.
9	Gallons		1 Firkin of Beer.
2	Firkins		1 Kilderkin.
2	Kilderkins		1 Barrel.
54	Gallons		1 Hhd. of Beer.
3	Barrels		1 Butt.

Note. The ale gallon contains 282 cubic inches.

Cubic or Solid Measure.

1728	Inches	make	1 Foot.
27	Feet		1 Yard.
40 Feet of round timber or 50 Feet of hewn timber			1 Ton or Load.*
128	Solid Feet		1 Cord of Wood.

Note. 8 feet in length, 4 in breadth, and 4 in height, making 128 solid feet, contain a cord of wood, and 16 such feet make 1 foot, cord-wood measure.—This measure respects length, breadth, and thickness.

Dry Measure.

2	Pints	make	1 Quart.
2	Quarts		1 Pottle.
2	Pottles		1 Gallon.
2	Gallons		1 Peck.
4	Pecks		1 Bushel.
2	Bushels		1 Strike.
4	Bushels		1 Coom.
8	Bushels		1 Quarter.
36	Bushels		1 Chaldron.
5	Quarters		1 Wey.
2	Weys		1 Last.

Note. The gallon dry measure contains 268$\frac{4}{5}$ cubic inches.

Time.

60	Seconds	make	1 Minute.
60	Minutes		1 Hour.
24	Hours		1 Day.
365	Days		1 Year.

Note. 365 days 5 hours 48 minutes 57 seconds make a solar year, according to the most exact observation.

*This may have reference either to the solidity or to the stowage on ship-board.

The number of days in each month is thus found:

Thirty *days hath September, April, June, and November;*
February hath twenty-eight *alone, and all the rest have* thirty-one.

When the year can be divided by 4 without a remainder, it is Bissextile or Leap-year, in which February hath 29 days.

MOTION.

60 Seconds (60″)	make - -	1 Minute—′
60 Minutes - - - - -		1 Degree—°
30 Degrees - - - - -		1 Sign.
12 Signs, or 360 degrees	- -	1 Great circle.

COMPOUND ADDITION

Teacheth to collect numbers of different denominations into one total.

RULE. Arrange the numbers so that those of the same denomination may stand directly under each other, and draw a line under them.

Add the numbers in the lowest denomination together, and find how many units of the next higher denomination are contained in their sum.

Write down the remainder, and carry the units to the next higher denomination, and proceed thus to the end.

FEDERAL MONEY.

d.	*c.*	*m.*	*d.*	*c.*	*m.*
174	74	3	396	14	4
198	19	3	147	19	5
157	14	3	149	57	9
169	76	9	157	83	8

ENGLISH MONEY.

£.	*s.*	*d.*	£.	*s.*	*d.*
149	14	$6\frac{3}{4}$	814	16	$6\frac{1}{2}$
387	19	$8\frac{1}{2}$	198	18	$8\frac{3}{4}$
259	16	$7\frac{1}{4}$	376	14	$9\frac{1}{2}$
874	17	$4\frac{3}{4}$	226	16	$7\frac{3}{4}$
678	15	$6\frac{1}{2}$	174	17	$10\frac{1}{2}$

Troy Weight.

lb.	oz.	dwt.	gr.
48	7	14	19
95	4	17	22
27	5	14	15
65	6	19	16
19	7	13	15

lb.	oz.	dwt.	gr.
83	11	15	22
15	6	16	19
21	8	19	23
33	9	15	14
46	4	13	17

Avoirdupois Weight.

ton.	cwt.	qr.	lb.	oz.	dr.
18	17	1	14	13	13
36	15	3	16	13	15
29	15	2	19	12	13
14	16	3	27	14	12
16	19	2	25	13	10
57	17	1	14	15	9

cwt.	qr.	lb.
593	1	19
187	3	19
159	2	25
283	3	13
146	2	18
259	1	22

Apothecaries' Weight.

lb.	oz.	dr.	sc.	gr.
3	7	5	1	17
1	3	2	2	13
2	5	3	2	14
3	4	2	1	15
5	2	2	2	17
2	3	1	2	18

lb.	oz.	dr.	sc.	gr.
2	5	3	2	11
1	2	2	1	14
3	3	5	2	13
5	5	4	1	12
2	9	3	2	15
1	6	4	2	17

Cloth Measure.

yd.	qr.	nl.
571	1	3
184	2	2
196	2	3
283	3	2
146	2	3
375	3	2

E. Fl.	qr.	nl.
873	2	3
196	2	2
158	1	1
147	2	3
326	2	2
194	2	1

E. Fr.	qr.	nl.
181	2	2
196	3	3
157	4	2
168	3	3
193	5	2
214	2	3

E. E.	qr.	nl.
56	1	2
19	2	3
14	3	2
26	1	3
83	2	2
57	3	3

Wine Measure.

tun.	hhd.	gal.	qt.	pt.
187	1	17	3	1
56	3	15	2	1
9	1	29	3	1
36	2	18	2	1
217	3	57	1	1
56	1	46	2	1

tun.	hhd.	gal.	qt.	pt.
177	3	16	2	1
56	2	57	3	1
8	3	14	2	1
17	2	19	1	1
68	1	38	2	1
25	2	52	3	1

Ale and Beer Measure.

hhd.	gal.	qt.	pt.
49	38	2	1
38	45	3	1
57	48	2	1
49	37	1	1
57	26	2	1
28	18	3	1

hhd.	gal.	qt.	pt.
78	17	3	1
19	16	2	1
15	51	3	1
76	43	2	1
23	26	3	1
52	38	2	1

Dry Measure.

qr.	bush.	pck.	qt.
57	4	2	1
19	5	3	1
38	6	2	3
27	7	3	7
5	3	1	4
9	2	2	3
72	5	3	2

chal.	bush.	pck.	qt.
576	31	1	3
19	27	2	2
56	15	3	5
25	8	2	4
9	9	1	6
14	15	2	3
32	26	3	2

Long Measure.

deg.	mil.	fur.	po.	ft.	in.	bar.
217	17	7	19	14	9	1
733	17	4	16	13	3	2
283	53	5	19	12	2	2
346	26	6	23	13	4	1
18	32	3	27	14	5	2
176	14	2	15	15	6	2
921	15	4	18	16	7	1

mil.	fur.	po.	yd.	ft.
876	7	13	4	2
129	6	26	2	1
167	4	19	3	2
157	3	15	2	2
286	2	27	1	1
194	5	32	2	2
176	4	18	5	2

LAND MEASURE.

acr.	roo.	per.	acr.	roo.	per.
741	1	19	870	3	19
69	3	29	19	2	16
15	2	16	54	3	37
37	3	14	129	2	20
16	2	13	187	3	14
29	3	27	136	2	19

TIME.

years.	days.	hrs.	min.	sec.	years.	days.	hrs.	min.	sec.
187	149	14	13	12	300	169	14	16	17
146	126	16	16	16	19	187	17	16	16
59	186	19	39	19	46	147	15	19	19
28	140	21	46	35	87	196	23	46	47
7	119	22	18	26	157	219	14	22	16
146	146	19	57	19	46	138	15	42	13

COMPOUND SUBTRACTION

Teacheth to find the inequality between numbers of divers denominations.

RULE. Having arranged the numbers so that the smaller may stand under the greater; subtract each number in the lower line from that which stands above it, and write down the remainders.

When any of the lower denominations are greater than the upper, increase the upper number by as many as make one of the next higher denomination, from which take the figure in the lower line, and set down the remainder, carry one to the next number in the lower line, and subtract as before.

FEDERAL MONEY

	dol.	ct.	m.	dol.	ct.	m.	dol.	ct.	m.
From	1901	95	1	435	00	1	170	10	3
Take	992	97	2	9	15	9	9	50	2

English Money.

	£.	s.	d.		£.	s.	d.
From	191	11	$3\frac{1}{2}$		304	19	$8\frac{1}{4}$
Take	114	16	$2\frac{1}{4}$		126	16	$8\frac{1}{2}$
From	389	18	$0\frac{1}{4}$		100	0	5
Take	9	19	4		11	11	$2\frac{3}{4}$

Troy Weight.

	lb.	oz.	dwt.	gr.	lb.	oz.	dwt.	gr.
From	87	11	11	13	27	10	15	22
Take	19	11	14	22	15	9	16	23

Avoirdupois Weight.

	ton.	cwt.	qr.	lb.	oz.	dr.	cwt.	qr.	lb.
From	100	10	1	11	14	13	59	1	11
Take	15	13	1	18	12	15	19	3	27

Apothecaries' Weight.

	lb.	oz.	dr.	sc.	gr.	lb.	oz.	dr.	sc.	gr.
From	2	3	4	1	13	2	1	3	1	15
Take	1	7	5	2	10	1	4	2	2	17

Cloth Measure.

	yd.	qr.	nl.	E.Fl.	qr.	nl.	E.E.	qr.	nl.	E.Fr.	qr.	nl.
From	251	1	2	189	2	1	419	1	3	389	2	2
Take	127	3	3	120	2	2	174	3	2	189	5	3

Wine Measure.

	tun.	hhd.	gal.	qt.	pt.	tun.	hhd.	gal.	qt.	pt.
From	591	1	13	1	1	800	1	50	2	1
Take	126	2	56	3	1	149	2	61	3	1

Ale and Beer Measure.

	hhd.	*gal.*	*qt.*	*pt.*	*hkd.*	*gal.*	*qt.*	*pt.*
From	571	19	3	1	100	36	2	1
Take	198	53	2	1	9	27	3	1

Dry Measure.

	qr.	*bu.*	*gal.*	*qt.*	*chal.*	*bu.*	*gal.*	*qt.*
From	38	4	5	3	69	21	3	2
Take	17	5	1	2	49	33	5	3

Long Measure.

	deg.	*m.*	*fur.*	*p.*	*f.*	*in.*	*bar.*	*m.*	*fur.*	*p.*	*f.*
From	819	13	1	19	11	3	1	219	3	14	11
Take	159	49	2	27	16	8	2	209	7	15	12

Land Measure.

	acr.	*roo.*	*per.*	*acr.*	*roo.*	*per.*	*acr.*	*roo.*	*per.*
From	591	1	11	501	3	13	219	2	21
Take	129	3	15	190	2	21	156	1	36

Time.

	yrs.	*da.*	*hr.*	*m.*	*sec.*	*yrs.*	*da.*	*hr.*	*m.*	*sec.*
From	171	143	11	14	19	811	111	15	23	52
Take	128	174	19	51	14	389	190	21	48	54

PRACTICAL QUESTIONS IN COMPOUND ADDITION AND SUBTRACTION.

1. Cast up the following sums, viz. twenty-three shillings and five pence, one pound and nine pence, seven shillings

and eleven pence three farthings, twenty pounds thirteen shillings and nine pence, fifteen pence three farthings.

	£.	s.	d.
	1	3	5
	1	0	9
	0	7	11¾
	20	13	9
	0	1	3¾
Ans.	£23	7	2½
Proof	£23	7	2½

2. Twenty dollars and four cents, five dollars and three mills, eighty-two cents, six dollars and five mills.

Ans. 31 dols. 86 cts. 8 m.

3. Seventy dollars, three dollars and three cents, thirty-four cents and four mills, eighty dollars and a half, six dollars and a quarter. Ans. 160 dols. 12 cts. 4 mills.

4. Ten pounds and three pence, forty-five shillings and ten-pence half-penny, thirty-seven shillings and four pence three farthings, nine pounds and three farthings, one shilling and six pence farthing, eighty-two shillings and four-pence half-penny. Ans. £27 7 5¾.

5. Thirty dollars six cents and a half, fifty-three cents and three quarters, eleven cents and a quarter, nine dollars eleven cents and a half, fifty-four cents. Ans. 40 dols. 37 cents.

6. Take three shillings and four pence from one pound two shillings and a penny. Ans. 18*s.* 9*d.*

7. From £5 2*s.* 1*d.* take nine shilllings and six-pence half-penny. Ans. £4 12 6½.

8. Take twenty shillings and three farthings from £8.

Ans. £6 19 11¼.

9. From 18 dollars take eight mills.

Ans. 17 dols. 99 cts. 2 m.

10. Take 53 dimes from 53 eagles.

Ans. 524 dols. 7 dimes or 70 cts.

11. A merchant bought 112 bars of iron, weighing 56 cwt. 1 qr. 11 lbs. of which he sold 59 bars, weighing 29 cwt. 3 qrs. 21 lb.; how many bars has he remaining, and what is the weight? Ans. 53 bars, weighing 26 cwt. 1 qr. 18 lb.

REDUCTION.

Reduction teacheth to change numbers from one denomination to another, without losing their value.

When numbers of a higher denomination are to be reduced to a lower, it is called *Reduction Descending*, and it is performed by *Multiplication.*

When numbers of a lower denomination are to be brought to a higher denomination, it is called *Reduction Ascending*, and it is performed by *Division.*

Rule. When the Reduction is Descending, multiply the highest denomination by as many of the next less as make one of the greater, adding to the product the parts of the same name, and so on to the last.

When the Reduction is Ascending, divide the given number by as many of that denomination as make one of the next higher, and so on to the denomination required, and the last quotient with the several remainders (if any) will be the answer.

The proof is by reversing the question.

Federal Money.

Note. The higher denominations of Federal money are reduced to any lower name by annexing the ciphers in the multiplier to their number.

Example.

How many Dollars, Dimes, Cents and Mills, in 97 Eagles?

Ans.	970	- Dollars.
	9700	- Dimes.
	97000	- Cents.
	970000	- Mills.

English Money.

In £987 14 6¾, how many farthings?

		Proof.
987 14 6¾		4)948219
20		
19754 shillings.		12)237054—3
12		
237054 pence.		20)19754—6
4		987 14 6¾
948219 farthings.		

Reduce the following sums separately into farthings, viz.

				Ans. *Farthings.*
£19	15	7½	- - - - -	
7	0	11	- - - - -	
100	19	6	- - - - -	
0	19	4¾	- - - - -	
17	17	4¼	- - - - -	
146	12	9½		140774

How many £ in the following sums, viz.

187	farthings - - - -	£
1301	pence - - - -	
773	half pence - - - -	
253	shillings - - - -	
85	pence - - - -	

Ans. £20 4 7¼

TROY WEIGHT.

1. In 15 lb. troy how many grains? Ans. 86400 grs.
2. How many ounces in 5749 dwt.? Ans. 287 oz. 9 dwt.
3. In 11 oz. 13 dwt. 13 grs. how many grains? A. 5605 grs.

AVOIRDUPOIS WEIGHT.

1. In 19 tons 14 cwt. 2 qrs. 19 lb. 11 oz. 13 drs. how many drams? Ans. 11316157 drs.
2. How many cwt. in 9563 lb.? Ans. 85 cwt. 1 qr. 15 lb.
3. In 13 cwt. 3 qrs. 21 lb. how many pounds? Ans. 1561 lb.

WINE MEASURE.

1. In 25 tuns of wine how many pints? Ans. 50400 pints.
2. How many hogsheads in 4935 qts.?
Ans. 19 h. 36 g. 3 qts.
3. In 3 hhds. 13 gals. 2 qts. how many half pints?
Ans. 3240 half pints.

CLOTH MEASURE.

1. In 158 yards how many nails? Ans. 2528 nails.
2. How many ells English in 5932 nails? A. 296 ells 3 qrs.

LONG MEASURE.

1. In 29 miles how many inches? Ans. 1837440 inches.
2. How many furlongs in 19753 yards?
Ans. 89 fur. 173 yds.
3. The length of a proposed aqueduct would be in one direction 8 ms. 2 fur. 6 perches, and in another, 7 ms. 2 fur. 20 perches. Required the difference in yards. Ans. 1683 yards.

Time.

1. How many hours in 57 years, allowing each year to be 365 days 6 hours? Ans. 499662 hours.
2. In 57953 hours how many weeks?
Ans. 344 w. 6 da. 17 hr.
3. How many days from 19th of March to the 23d of September following? Ans. 188 days.

Land Measure.

1. In 41 acres 2 roods 14 perches, how many rods?
Ans. 6654 rods or perches.
2. How many square rods in 7752 square feet?
Ans. 28 rods 129 feet.
3. In 5972 perches, how many acres?
Ans. 37 acres 1 rood 12 perches.

Solid Measure.

1. In a pile of wood 96 feet long, 5 feet high, and 4 feet wide, how many cords? Ans. 15 cords.
2. In 82 tons of round timber, how many inches?
Ans. 5667840 inches.

When grindstones are sold by the cubic foot, the contents are thus found. To the whole diameter add half of it, and multiply the sum of these by the same half, and this product by the thickness; divide this last number by 1728, the inches in a cubic foot, and the quotient is the contents or answer required.

Example.

How many cubic feet or stones in a grindstone, measuring 40 inches in diameter and 9 inches thick?

$$40+20=60\times20=1200$$
$$1200\times9=10800$$
$$1728)10800(6$$
$$10368$$
$$432\times4=1728$$
$$1728)1728(1$$
$$1728$$

Ans. $6\frac{1}{4}$ F, or Stones.

Required the contents and weight of a grindstone 48 inches in diameter, and $6\frac{3}{4}$ inches thick.

48÷24=72×24=1728, or 1 cubic foot, at 1 inch thick.
1 foot×$6\frac{3}{4}$=$6\frac{3}{4}$ cubic feet for the contents.
$6\frac{3}{4}$ feet×160 lbs. to a foot=1080 lbs.
Actual weight of it in Boston=1075 lbs.

When sold by weight the calculation is made as in the following

EXAMPLES.

What will a grindstone, weighing 375 lbs. come to at $14 per ton of 2000 lbs.

375	Or, 375
14	at 7 ms. per lb.
2,000)5,250	$2,625
2,625	Ans. $2,62½ cents.

AMERICAN CURRENCIES.

The dollar is rated differently in several of the states. This difference is owing to the depreciation of their currencies previous to the revolution.

In New England, Virginia, Kentucky, Tennessee, and Ohio, the dollar is -	6*s*	or $3\frac{1}{3}$	to £ 1
New York and North Carolina, - -	8*s*	$2\frac{1}{2}$	1
New Jersey, Pennsylvania, Delaware, and Maryland, -	7*s*6	$2\frac{2}{3}$	1
South Carolina and Georgia, - -	4*s*8	30	7
Canada and Nova Scotia, - - -	5*s*	4	1
Newfoundland, like Sterling, - -	4*s*6	40	9

To change New England and Virginia currency to Federal money, the dollar being 6 *shillings.*

RULE. As the value of a dollar is equal to three tenths of a pound, when pounds are given to be changed, annex three ciphers to the sum, and divide the whole by 3; the quotient is the answer in cents.

EXAMPLE.

Change £523 to Federal money.

3)523000

174333⅓ cents. Ans. 1743 dols. 33⅓ cents.

When pounds and shillings are given, to the pounds annex half the number of shillings and two ciphers if the number of shillings in the given sum be even; but if the number be odd, annex half the number, and then 5 and one cipher, and divide by 3; the quotient is the answer in cents.

EXAMPLES.

1. Change £59 18*s.* to Federal money.

3)59900

19966⅔ cents. Ans. 199 dols. 66⅔ cts.

2. Change £93 13*s.* to Federal money.

3)93650

31216⅔ cents. Ans. 312 dols. 16⅔ cts.

When there are shillings, pence, &c. in the given sum, annex for the shillings as before directed, and to these add the farthings in the given pence and farthings, observing to increase their number by one when they exceed 12, and by two when they exceed 37, and divide as before.

EXAMPLES.

1. Change £21 8*s.* 4½*d.* to Federal money.

3)21419 4 is annexed to the pounds for half the shillings, and 19 for the farthings in 4½*d.* and excess of 12.

7139⅔ cts. Ans. 71 dols. 39⅔ cts.

2. Change £117 16*s.* 2*d.* to Federal money.

3)117808

39269⅓ cts. Ans. 392 dols. 69⅓ cts.

3. Change £721 9*s.* 11¼*d.* to Federal money.

3)721497 In this example 4 is annexed to the pounds for half the even shillings, and 47 for the farthings in 11¼*d.* and excess of 37, and then 5 is added to the figure next to half the shillings, make it 9, in place of 4 for the odd shilling.

240499 cts. Ans. 2404 dols. 99 cts.

4. Change £29 11*s*. 2¼*d*. to Federal money.

3)29659

9853 cts. Ans. 98 dols. 53 cts.

To change Federal money to New England and Virginia Currency.

RULE. When the sum is dollars only, multiply it by 3, and double the first figure of the product for shillings, and the rest of the product will be pounds.

When there are cents in the given sum, multiply the whole by 3, and cut off three figures of the product to the right hand as a remainder.

Multiply this remainder by 20 and cut off as before.

Proceed in this manner through the several parts of a pound, and the numbers standing on the left hand make the answer in the several denominations.

NOTE. If there be mills, cut off four figures, and proceed as above.

EXAMPLE.

1. Change 872 dollars to New England currency.

872
3

26112

Ans. £261 12*s*.

2. Change 1971 dollars 96⅔ cents to Massachusetts currency.

1971 96⅔
3

£591,590
20

s.11,800
12

d.9,600
4

f. 2,400

Ans. £591 11 9½.

3. Reduce 1259 dollars 89 cents and 7 mills, to Massachusetts currency.

1259 89 7
3

£377,9691
20

s.19,3820
12

d.4,5840
4

f. 2,3360

Ans. £377 19 4½.

To change New York and North Carolina currency to Federal money, the dollar being 8 shillings.

RULE. Prepare the given sum by the rule for New England money, and divide by 4; the quotient is the answer in cents.

EXAMPLES.

1. Change £461 to Federal money.

4)461000

115250 cts. Ans. 1152 dols. 50 cts.

2. Change £419 10*s.* 8½*d.* to Federal money.

4)419535

104883¾ cts. Ans. 1048 dols. 83¾ cts.

To change Federal money to New York and North Carolina currency.

RULE. As for Massachusetts currency using 4 as a multiplier instead of 3; the value of a dollar being equal to four tenths of a pound.

EXAMPLES.

1. Change 1684 dollars to New York and North Carolina currency.

1684
4

Ans. £673 12

2. Change 1048 dols. 83¾ cents to New York currency.

1048,83¾
4

419,535
20

10,700
12

8,400
4

1,600 Ans. £419 10*s.* 8½*d.*

To change New Jersey, Pennsylvania, Delaware and Maryland currency to Federal money, the dollar being 7s. 6d.

Rule. As the value of a dollar is equal to $\frac{3}{8}$ of a pound, multiply the given sum, when it is pounds only, by 8, and divide by 3 for dollars. If there be shillings, &c. increase the sum in pence by $\frac{1}{3}$ of the whole sum for cents.

Examples.

1. Change £471 to Federal money.

471
8

3)3768

Ans. 1256 dollars.

2. Change £480 19s. 9d. to Federal money.

480 19 9
20

9619
12

9)115437
12826$\frac{1}{3}$

128263$\frac{3}{4}$ cents. Ans. 1282 dols. 63$\frac{3}{4}$ cts.

To change Federal money to New Jersey, Pennsylvania, Delaware and Marylaud currency.

Rule. Multiply the sum, when in dollars, by 3, and divide by 8 for pounds. If there be dollars and cents, multiply the given sum by 90, and the product, (rejecting two figures on the right) is pence, or deducting $\frac{1}{10}$ of the sum gives the pence likewise.

Examples.

1. Change 1256 dollars to Pennsylvania currency.

1256
3

8)3768

Ans. £471

2. Change 1282 dols. 63⅓ cents to Pennsylvania currency

	Or
128263⅓	$\frac{1}{10}$)128263⅓
90	12826⅓
12)115437,00	12)115437
20)9619—9	20)9619—9
Ans. £480 19 9	Ans. £480 19 9 as before.

To change South Carolina and Georgia currency to Federal money, the dollar being 4s. 8d.

Rule. As the value of a dollar is equal to $\frac{7}{30}$ of a pound, if the sum be pounds only, multiply it by 30, and divide by 7 for dollars. If there be shillings, &c. annex two ciphers to the pence in the given sum, and divide by 56, the pence in a dollar, the quotient is the answer in cents.

Examples.

1. Change £28 to Federal money.

28
30

7)840

120 Ans. 120 dols.

2. Change £11 4 8 to Federal money.

11 4 8
20

224
12

8×7=56 8)269600

7)33700

4814⅞ Ans. 48 dols. 14⅞ cts.

To change Federal money to South Carolina and Georgia currency.

Rule. Multiply the dollars by 7, and divide by 30 for pounds. If there be dollars and cents, multiply by 56, and the product (rejecting two figures on the right) is the answer in pence.

EXAMPLES.

1. Change 540 dols. to S. Carolina and Georgia currency.

540
7

3,0)378,0

Ans. £126

2. Change 48 dols. 14¾ cts. to South Carolina currency.

4814¾	56
56	2
28884	7)112
24070	
16	16
12)2696,00	Or 7)56
20)224—8	8×2=16.
11 4 8	Ans. £11 4 8

In like manner may Newfoundland money or Sterling be reduced, using, 54*d.* instead of 56, and the proportion as £9 to $40.

To change Canada and Nova Scotia currency to Federal money, the dollar being 5 shillings.

RULE. As the value of a dollar is equal to one fourth of a pound, multiply the sum, when in pounds, by 4, for dollars. When there are shillings, &c. reduce the given sum to pence, annex two ciphers. and divide by 60, for cents.

EXAMPLES.

1. Change £36 Canada currency to Federal money.

36
4

Ans. 144 dols.

2. Change £528 12*s.* 6*d.* Canada currency to Federal money.

528 12 6
20
10572
12
6,0)1268700,0
211450 cents.

Or thus,
528
4
2112
10 shil.= 2
2*s.* 6*d.*= 0 50
2114 50
Ans. 2114 dols. 50 cents.

To change Federal money to Canada and Nova Scotia currency.

RULE. Divide the sum in dollars by 4, for pounds.

If there be dollars and cents, multiply the given sum by 60, and the product, (rejecting two figures on the right) is the answer in pence.

EXAMPLES.

1. Change 144 dollars to Canada currency.

4)144

Ans. £36

2. Change 2114 dollars 50 cts. to Canada or Nova Scotia currency.

2114,50
60
12)126870,00
2,0)1057,2—6
528 12 6 Ans. £528 12*s.* 6*d.*

3. Change £364 6*s.* 4*d.* of the preceding currencies to Federal money.

Ans. $1214,39 at 6*s.* to the dollar.
910,79 8*s.* "
971,51 7*s.* 6*d.* "
1561,35 4*s.* 8*d.* "
1457,26 5*s.* "
1619,18 4*s.* 6*d.* "

A Table for reducing shillings and pence of the different currencies to cents and mills.

	at 8*s.*	7*s.*6*d.*	6*s.*	4*s.*8*d.*	5*s.*	4*s.*6*d.*
	cts. m.	cts. m.	cts. m.	cts. m.	cts. m.	cts. m.
*Shills.*10	125 0	133 3	166 7	214 3	200 0	222 2
9	112 5	120 0	150 0	192 8	180 0	200 0
8	100 0	106 7	133 3	171 4	160 0	177 7
7	87 5	93 4	116 7	150 0	140 0	155 5
6	75 0	80 0	100 0	128 6	120 0	133 3
5	62 5	66 7	83 3	107 1	100 0	111 1
4	50 0	53 4	66 7	85 7	80 0	88 8
3	37 5	40 1	50 0	64 3	60 0	66 6
2	25 0	26 7	33 3	42 9	40 0	44 4
1	12 5	13 4	16 7	21 4	20 0	22 2
Pence 11	11 5	12 2	15 3	19 5	18 3	20 4
10	10 4	11 1	13 9	17 9	16 7	18 5
9	9 4	10 0	12 5	16 1	15 0	16 7
8	8 3	8 9	11 1	14 3	13 3	14 8
7	7 3	7 8	9 7	12 5	11 7	13 0
6	6 3	6 7	8 3	10 7	10 0	11 1
5	5 3	5 6	7 0	8 9	8 3	9 3
4	4 1	4 5	5 6	7 1	6 7	7 4
3	3 1	3 4	4 2	5 3	5 0	5 5
2	2 0	2 2	2 8	3 6	3 3	3 7
1	1 0	1 1	1 4	1 8	1 7	1 8

COMPOUND MULTIPLICATION

Is the multiplying of numbers of different denominations by a simple figure or figures, whose product shall be equal to a proposed number or numbers.

Rule. Write the multiplier under the lowest denomination of the multiplicand; multiply every number of the multiplicand by the multiplier, and bring the several products as they occur to the next higher denominations; write down the remainders, and carry the integers to the next product.

Examples of Money.

1. Multiply	£191	17	8½		£913	11	9¾
by			2				5
Ans.	£383	15	5		£4567	19	0¼

£	s.	d.		£	s.	d.
2	6	7½		2	6	7½
		9				5
20	19	7½				7
		5				
104	18	1½				11
		7				
734	6	10½				9
		11				
£8077	15	7½		£8077	15	7½

2. What will 7 yards of shalloon come to at 3*s.* 5*d.* per yard?

3 5
7

Ans. £1 3 11

3. 4 yards at 6*s.* 8*d.* - - - - - - - Ans. £1 6 8
4. 5 - - - 5*s.* 9*d.* - - - - - - - 1 8 9
5. 7 - - 19*s.* 6*d.* - - - - - - - 6 16 6

If the number or quantity exceed 12, and is to be found in the table, multiply by its component parts.

EXAMPLES.

1. 14 yards at 9 5½ per yard.
2

18 11 price of 2 yards.
7

Ans. £6 12 5 price of 14 yards.

2. 16 yards at 4*s.* 9*d.* Ans. £ 3 16 0
3. 28 lbs. at 6*s.* 5¾*d.* 9 1 5
4. 144 g's. at 5*s.* 7¾*d.* 40 13 0

To multiply by fractional parts, as ¼, ¾, ⅞, *&c.*

RULE. Multiply the price by the upper figure of the fraction, and divide the product by the lower, the quotient will be the answer; but when the upper figure is not more than one, dividing the price or sum by the lower figure, gives the answer.

EXAMPLES.

1. What is $\frac{3}{4}$ of a yd. of cambric worth, at 12*s.* 6*d.* per yd.

12 6
3

8)37 6

Ans. 4*s.* 8$\frac{1}{4}$*d.*

2. What is $\frac{1}{4}$ of a yard of broadcloth worth, at 35*s.* per yd.?

35 Or thus, 2)35
3

4)105 2)17 6 price of half a yard.
8 9 a quarter.

Ans. 26*s.* 3*d.* 26 3

3. One quarter of a yard of fine linen, at 7*s.* 6*d.* per yard?

4)7 6

Ans. 1*s.* 10$\frac{1}{2}$*d.*

4. Multiply £9 6*s.* 8*d.* by $\frac{7}{8}$, or take $\frac{7}{8}$ of it?

9 6 8
7

8)65 6 8

Ans. £8 3 4

5. What is the cost of a piece of handkerchiefs, containing $\frac{7}{12}$ of a dozen at 69*s.* per dozen.

$69\times7=\frac{483}{12}=40s.3$ or, $\frac{5\,9}{12}=5\ 9\ 7$

40 3=$6,71.

6. One dozen of each of three kinds of silk hose, viz. at 37*s.* 46*s.* and 48*s.* Required the amount.

$37+46+48=\frac{131}{8}=\$21,83$ cts.

7. Two pieces of ribbon of three kinds, each, viz.; at 45 cents, 60 cents, and 75 cents. What is the cost?

45+60+75=180
2

Ans. $3,60

8. Required the cost of 4 pieces of vesting of $4\frac{1}{2}$ yds. each, viz. at 3*s*7, 3*s*10, 4*s*2, and 6*s*.

	s.	*d.*
3*s*7+3*s*10+4*s*2+6*s*.=	17	7
		$4\frac{1}{2}$
	70	4
	8	$9\frac{1}{2}$
	6)79	$1\frac{1}{2}$

Ans. $13,19

9.	$\frac{1}{4}$ yard at	4*s*.	3*d*.	-	-	-	-	£0	1 $0\frac{3}{4}$
10.	$\frac{1}{2}$ - -	5*s*.	9*d*.	-	-	-	-	0	2 $10\frac{1}{2}$
11.	$\frac{3}{4}$ - -	8*s*.	4*d*.	-	-	-	-	0	6 3
12.	$3\frac{1}{2}$ yards	4*s*.	3*d*.	-	-	-	-	0	13 $9\frac{3}{4}$
13.	$7\frac{1}{2}$ - -	5*s*.	9*d*.	-	-	-	-	2	3 $1\frac{1}{2}$
14.	$11\frac{3}{4}$ - -	8*s*.	4*d*.	-	-	-	-	4	17 11
15.	$9\frac{1}{4}$ - -	7*s*.	3*d*.	-	-	-	-	3	7 $0\frac{3}{4}$
16.	$25\frac{1}{4}$ - -	7*s*.	9*d*.	-	-	-	-	9	15 $8\frac{1}{4}$
17.	$19\frac{3}{4}$ - -	23*s*.	3*d*.	-	-	-	-	22	19 $2\frac{1}{4}$
18.	$56\frac{1}{8}$ - -	12*s*.	4*d*.	-	-	-	-	34	12 $2\frac{1}{2}$
19.	$11\frac{3}{8}$ - -	17*s*.	6*d*.	-	-	-	-	9	19 $0\frac{3}{4}$

When the quantity, or multiplier, cannot be produced by the multiplication of small numbers, the calculation is usually made in the following manner.

EXAMPLE.

4568 yards at 7*s*. $1\frac{3}{4}$*d*. per yard.

10

3	11	$5\frac{1}{2}$	price of		10	yards.
		10				
35	14	7	-	-	100	"
		10				
357	5	10	-	-	1000	"
		4				
1429	3	4	-	-	4000	"
178	12	11	-	-	500	"
21	8	9	-	-	60	"
2	17	2	-	-	8	"
Ans. £1632	2	2	for		4568	

This is the usual method in schools, but in business it is thus calculated:

		s.	d.
4568 yards at 7s.	- -	31976	0
" 1d.	- -	380	8
" ½d.	- -	190	4
" ¼d.	- -	95	2
		2,0)32642	2
		£1632	2 2 as before.

Yards.		*s.*	*d.*		*s.*	*d.*	
3	at	9	7	N. E.	28	9	= $4,79
5	-	11	4	-	56	8	9,44
3	-	6	3	-	18	9	3,12½
9	-	11	8	-	105	0	17,50
10	-	12	5	-	124	2	20,69
11	-	3	7	-	39	5	6,57
12	-	8	4	-	100	0	16,67
14	-	2	4	-	32	8	5,44
15	-	3	3	-	48	9	8,12½
39	-	2	1	-	81	3	13,54
47	-	5	2	-	242	10	40,47
65	-	7	4	-	476	8	79,44
86	-	8	6	-	731	0	121,83
40	-	12	5¼	-	497	6	82,91
47	-	1	4	-	62	8	10,44
69	-	3	3	-	224	3	37,37
112	-	4	2	-	466	8	77,78
236	-	3	1½	-	737	6	122,91
19.7	-	7	6¾	-	1489	9¾	248,30

Yards.		*s.*	*d.*		
317¼	at	11	4½	N.E. &c.	=$793,61
413	-	2	9½		
793¾	-	7	9½	N. Y. &c.	773,08
1746	-	11	6¾	P., Md., &c.	2691,75
576	-	4	11¼	S. C. & G.	614,57
357½	-	73	9	Sterling.	5859,03

BILLS OF PARCELS.

———, *August* 15*th*, 1826.

Mr. A. B. Bought of G. & H. - - *No.* 17, ——— *Street.*

8	pair worsted hose	-	at 4*s.* 6*d.*	- $
5	do. thread do.	- -	3*s.* 2*d.*	-
3	yds. kerseymere	- -	14*s.*	-
6	do. muslin	- - -	4*s.* 2*d.*	-
2	do. tammy	- - -	1*s.* 8*d.*	-
4	shawls	- - - -	7*s.* 6*d.*	-
64½	yds. striped nankins	- -	2*s.*	-
32	ells mode	- - - -	3*s.*	-
28½	yds. calico	- - -	2*s.* 4*d.*	-
2	gross gilt coat buttons	-	18*s.* 6*d.*	
3	pieces russel	- - -	34*s.*	-
2	pieces muslin	- - -	30*s.*	-
25	yds. Irish linen	- -	2*s.*	-
28½	yds. stormount calico	- -	2*s.* 6*d.*	-
28½	do. red do.	- -	2*s.* 2*d.*	-
1	piece durant	- - -	56*s.*	-
2	pieces blue shalloon	- -	57*s.* 6*d.*	-
50½	yds. demity	- - -	2*s.* 6*d.*	-
3	pieces persian	- - -	84*s.*	-

Amount at 6*s.* to the dollar - -	$229,15
8*s.* - - - - - -	171,86
7*s.* 6*d.* - - - -	183,32
4*s.* 8*d.* - - - - -	294,62

Mr. G. H. Bought of C. D.

2	brass fire sets	- - - - -	$9,50 -	$19,00
12	lbs. 8 oz. brass kettle	- - - -	,60 -	7,50
2	doz. looking glasses	- - - -	4,25 -	8,50
½	doz. shovels	- - - - - -	60*s.* -	5,00
½	doz. sickles	- - eh. -	22*s.* 6*d.* & 25*s.* 6*d.* -	4,00
1⅓	doz. scissors	- - - - -	7*s.* 6*d.* -	1,67
1 1/12	doz. cast steel files	- - - -	33*s.* -	5,95
1	doz. combs	- - eh. 6*s.* 9*d.*, 5*s.* 3*d.* & 4*s.* 6*d.* -		2,75
6	pair pl'd candlesticks	- - - -	5*s.* 3*d.* -	5,25
½	doz. No. 10 cotton cards	- - -	36*s.* -	3,00
½	doz. trunk locks	- eh.	4*s.*, 5*s.* 3*d.* & 6*s.* -	1,27
63	qrs. screw augers	- - - - -	8 cts. -	5,04
18	setts knives and forks	- - - -	4*s.* 6*d.* -	13,50
6	" do. do.	eh. - -	7*s.* 6*d.* & 6*s.* -	13,50
2	pair steelyards	- eh. -	12*s.*, 9*s.* & 6*s.* -	9,00
1	M brass nails	- eh.	6*s.*, 9*s.* & 10*s.* 6*d.* -	4,25
3	X cut saws	- - - - - -	42*s.* -	21,00
⅓	doz. marking irons	- - - - -	12*s.* -	1,33
100	fish hooks	- - eh. 1*s.* 6*d.*, 2*s.* 3*d.* & 4*s.* 6*d.* -		1,38
1	doz. butt hinges	- eh. 6*s.*, 6*s.* 9*d.*, 7*s.* 6*d.* & 9*s.* -		4,88

NOTE. When the price per dozen is given in English money, the price of the single article or pair may be found mentally, by valuing it at as many pence as there are shillings in the price per dozen; thus at 9*s.* it is 9*d.* single—16*s.* 6*d.* is 1*s.* 4*d.* ½,—37*s* is 3*s.* 1*d* &c

James Dunning — *Cr.*

By	84 lb. Butter	at 15 cts.	$12,60
"	6 bushels Rye	80 -	
"	567 lb. Cheese	8 -	
"	296 " Pork	6¾ -	
"	139 " Clover Seed	8 -	
"	16 " Honey	12½ -	

Dr.

To	20 gallons Molasses	at 32 cts.	$6,40	
"	5 lbs. Tea	96 -		
"	11¼ " Brass Kettle	80 -		
"	2 Dutch Ovens	$1,25 -		
"	2 pair Shovel and Tongs	1,75 -		
"	Order at A's store pr bill receipted	-	33,75	

Required the balance, and if for, or against J. D. $

Ans. $35,91 in his favour.

G. A. in account with B. N. — *Dr.*

To	94 lbs. Coffee	at 17½ cts.	$16,45
"	85 gallons Molasses	30 -	
"	Cash, twenty dollars, per receipt	-	
"	3 barrels Flour	$7,50 -	
"	256 lbs. Meal at 80 cts. per 54 lbs.	-	
"	Cash, paid S. G. per order	-	20,56
"	15 yards Baize	56 cts. -	
"	12 do. Linen	60 -	

$

Cr.

By	19 cords Wood	at $3,50	$66,50
"	7 do. Bark	4,50	
"	3 do. Refuse Wood	1,75	
"	62½ lbs. Butter	,16	
"	3124 feet Merch. Boards	9,50	
"	480 do. Refuse do.	6,25	

Required the balance of this account, and in whose favour $

Ans. $21,58 in favour of G. A.

WEIGHTS AND MEASURES.

	lb.	*oz.*	*dwt.*	*grs.*		*lb.*	*oz.*	*dwt.*	*grs.*
Multiply	14	9	14	17		825	8	19	22
by				5					8
Product	74	0	13	13		6605	11	19	8

T.	*cwt.*	*qrs.*	*lbs.*	*Cwt.*	*qr.*	*lbs.*	*o z.*	*dr.*
19	17	3	25	17	1	14	11	14
			9					7

T.	*hhd.*	*gal.*	*T.*	*p.*	*hhd.*	*gal.*
87	1	57	28	1	1	62
		5				7

What is the weight of 47 casks of rice, each weighing 2 *c.* 1 *qr.* 23 *lb.*? Ans. 115 *cwt.* 1 *qr.* 17 *lb.*

COMPOUND DIVISION

Teacheth to find how often one number is contained in another of different denomination.

Rule. Begin at the left hand, and divide each denomination by the divisor, setting down the quotients under their respective dividends. But if there be a remainder, after dividing any of the denominations except the least, find how many of the next lower denomination it is equal to, and add it to the number, if any, which was in this denomination before, then divide the sum as usual, and so on till the whole is finished.—The method of proof is the same as in Simple Division.

Examples of Money.

Divide £19 14 9½ by 2.

2)19 14 9½

Ans. £9 17 4¾

Divide £900 11 9¾ by 3.

3)900 11 9¾

£300 3 11¼

4)2354 12 6

9)588 13 1½

7)65 8 1½

5)9 6 10½

Ans. £1 17 4½

5)2354 12 6

9)

7)

4)

Ans. £1 17 4½

If the divisor exceed 12, *and it be found in the table, divide by its component parts.*

EXAMPLES.

1. Divide £278 8*s.* 9*d.* between 45 men equally.

5)278 8 9

9)55 13 9

Ans. £6 3 9 to each.

2. If 108 yards cost £45 13*s.* 6*d.* what is it per yard?
Ans. 8*s.* 5½*d.*

3. If 1000 gallons of molasses cost £209 7*s.* 6*d.* how much is it per gallon? Ans. 4*s.* 2¼*d.*

If the divisor cannot be found by the multiplication of small numbers, as in the preceding examples, divide by it as in the following

EXAMPLES.

1. Divide £46 1*s.* 11*d.* by 37.

37)46 1 11(£1
37

9
20

37)181(4*s.*
148

33
12

37)407(11*d.*
407

Ans. £1 4*s.* 11*d.*

2. Divide £33 13*s.* 8½*d.* by 23. £1 9*s.* 3½*d.*

3. If 345 quintals of fish cost £409 13*s.* 9*d.* how much is it per quintal? Ans. £1 3*s.* 9*d.*

4. If 4568 yards of cloth cost £1632 2*s.* 2*d.* how much is it per yard? Ans. 7*s.* 1¾*d.*

To divide by fractional parts.

Invert the divisor, and proceed as in Multiplication—*page* 51.

1. When the divisor is 1, with one or more ciphers, cut off the ciphers in the divisor, and the same number of figures from the right hand of the integers of the dividend for a remainder, reduce this remainder to the next lower name, and take in those numbers of the dividend which are of the same denomination: proceed in this manner to the least name, and the several quotients taken together, will be the answer. When the question is in Federal money, the answer is found as in Simple Division. This method of dividing applies to all questions of Interest, Commission, Buying and Selling of Stocks, &c. when the rate is at so much per cent. or 100.

EXAMPLES.

Divide £788 19*s.* 2*d.* equally between 100 men.

100)7,88 19 2
20
17,79
12
9,50
4
2,00

Ans. £7 17*s.* 9½*d.*

What is the commission on £448 1*s.* 11¾*d.* at 4 per cent.?

448 1 11¾
4
100)17,92 7 11
20
18,47
5,75
4
3,00

Ans. £17 18 5¾.

What is the interest of $1473 for one year, at 6 per cent.?

1473
6 cts. per $.
8838 cts.

Ans. $88,38 cts.

Divide the following sums severally by 100.

£955 10*s.* 5*d.* Ans. £9 11 1¼
1776 17*s.* 6*d.* - 17 15 4½
3888 12*s.* 11*d.* - 38 17 8¾

$738,50 cts. - $7,38,5
1111,95 " - 11,11,9½
1923,75 " - 19,23,7½

Having the price of a cwt. to know how much it is per lb.

2. RULE. Find the price of 1 or 2 quarters, and then divide by the component parts.

If 5 cwt. of iron cost £8 15*s* 0*d*. how much is it per lb.?

5)8 15 0

4)1 15 0 price of 1 cwt.

28= { 4)0 8 9 - - 1 quarter.
{ 7)0 2 $2\frac{1}{4}$

Ans. £0 0 $3\frac{3}{4}$ - - 1 lb.

If $\frac{3}{8}$ of a farm is worth $450, what is the whole valued at? Ans. $1200.

Three sevenths of a piece of land containing 47 acres 3 roods 25 perches is to be set off to A, how much land is he to have? Ans. 20 acres 2 roods 5 perches.

DECIMAL FRACTIONS.

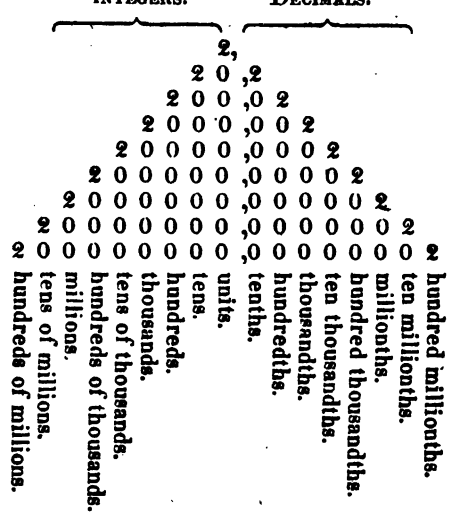
A DECIMAL FRACTION is that, whose denominator is an unit, with as many ciphers annexed to it as the numerator has places, and is usually expressed by writing the numerator only, with a point before it, called the separatrix; thus, $\frac{5}{10}$, $\frac{35}{100}$, $\frac{125}{1000}$, are decimal fractions, and are expressed by ,5 ,25 ,125 respectively.

The figures to the left hand of the separatrix are whole numbers; thus 4,5 yards is 4 yards and 5 tenths, or one half of another yard.

Ciphers, placed to the right hand of decimals, make no alteration in their value; for ,5 ,50 ,500, &c. are decimals of the same value, being each equal to $\frac{1}{2}$; but when placed to the left hand, the value of the fraction is decreased in a ten-fold proportion; thus ,5 ,05 ,005, &c are 5 tenth parts, 5 hundredth parts, 5 thousandth parts, respectively.

The different value of figures will appear plainer by the following

TABLE.


INTEGERS.
DECIMALS.
2,
2 0 ,2
2 0 0 ,0 2
2 0 0 0 ,0 0 2
2 0 0 0 0 ,0 0 0 2
2 0 0 0 0 0 ,0 0 0 0 2
2 0 0 0 0 0 0 ,0 0 0 0 0 2
2 0 0 0 0 0 0 0 ,0 0 0 0 0 0 2
2 0 0 0 0 0 0 0 0 ,0 0 0 0 0 0 0 2
units.
tens.
hundreds.
thousands.
tens of thousands.
hundreds of thousands.
millions.
tens of millions.
hundreds of millions.
tenths.
hundredths.
thousandths.
ten thousandths.
hundred thousandths.
millionths.
ten millionths.
hundred millionths.

From this table it appears, that as whole numbers increase in a tenfold proportion from units to the left hand, so decimals decrease in the same proportion to the right,—and that in decimals, as in whole numbers, the place of a figure determines its relative value.

Examples for writing decimals.

Five tenths - - - - - - - - ,5
Five hundredths - - - - - - - ,05
Five thousandths - - - - - - - ,005
Five hundred thousandths - - - - ,00005
Fifty three thousandths - - - - - ,053
Five, and fifteen hundredths - - - - 5,15
Fifteen millionths - - - - - ,000015
Eight hundred and nine thousandths - - - ,809
Eight hundreds, and nine thousandths - - 800,009
Eighteen hundred thousandths - - - - ,00018
One, and one hundredth - - - - 1,01
Four hundred and forty one millionths - - ,000441
Four hundreds, and forty one millionths - - 400,000041

ADDITION OF DECIMALS.

RULE. Place the given numbers so that the decimal points may stand directly under each other, then add as in whole numbers, and point off so many places for decimals to the right as are equal to the greatest number of the decimal places in any of the given numbers.

EXAMPLES.

263,51	42,23	2,1
149,28	18,47	,5
293,53	9,3	26,17
184,69	52,384	,7
129,4	2,1	5,
1020,31	124,484	34,47

Required the sum of twenty nine and three tenths, three hundred and seventy four and nine millionths, ninety seven and two hundred and fifty three thousandths three hundred and fifteen and four hundredths, twenty seven, one hundred and four tenths. Ans. 942,993009.

Required the sum of ten dollars and twenty nine cents, ninety three cents and three mills, nine cents and six mills, and two dollars and eight mills.

Ans. 13 dols. 32 cts. 7 mills.

SUBTRACTION OF DECIMALS.

RULE. Place the given numbers so that the decimal points may stand directly under each other, and then point off the decimal places as in addition.

EXAMPLES.

From	219,42	87,26	57,	311,
Take	184,38	19,4	9,375	11,11
	35,04	67,86	47,625	299,89

From two thousand and sixteen hundredths take one thousand and four, and four millionths. Ans. 996,59996.

From twenty four thousand nine hundred and nine and one tenth take fourteen thousand and twenty nine thousandths. Ans. 10909,071.

Take eighty five and seven hundred and thirty seven thousandths from one hundred. Ans. 14263.

From five hundred and thirty one dollars two cents take one hundred and seventeen dollars three cents and four mills. Ans. 413 dols. 98 cts. 6 m.

MULTIPLICATION OF DECIMALS.

Multiply exactly as in whole numbers, and from the product cut off as many figures for decimals to the right hand as there are decimals in both factors, but if the product should not have so many, supply the defect by prefixing ciphers.

EXAMPLES.

Multiply	36,5	29,831	3,92
by	7,27	,952	196
	2555	59662	2352
	730	149155	3528
	2555	268479	392
Product	265,355	28,399112	768,32

Multiply	,285	,285	,29	124
by	,8	,003	,1	,06
Product	,2280	,000855	,029	7,44

NOTE. To multiply decimal fractions by 10, 100, 1000, &c. is only to remove the separatrix so many places towards the right as there are ciphers.

Thus, 7,362937 multiplied by $\left\{\begin{matrix}10\\100\\1000\\10000\end{matrix}\right\}$ is $\left\{\begin{matrix}73,62937\\736,2937\\7362,937\\73629,37\end{matrix}\right.$

Multiply twenty nine and three tenths by seventeen. Ans. 498,1.

Multiply twenty seven thousandths by four hundredths. Ans. ,00108.

Multiply two thousand and four and two tenths by twenty-seven. Ans. 54113,4.

DIVISION OF DECIMALS.

RULE. Divide as in whole numbers, and from the right hand of the quotient point off as many places for decimals as

the decimal places in the dividend exceed those of the divisor. If the places of the quotient are not so many as the rule requires, supply the defect by prefixing ciphers. If at any time there be a remainder, or the decimal places in the divisor are more than those in the dividend, ciphers may be annexed to the dividend, and the quotient carried to any degree of exactness.

EXAMPLES.

92),863972(,009391	,853)89,000 (104,337, &c.
828	853
359	3700
276	3412
837	2880
828	2559
92	3210
92	2559
	6510
	5971
	539

The various kinds that ever occur in division are included in the following cases, viz.

Divide		by		Ans.
	,803		,22	3,65
	8,03		2,2	,365
	,803		22	,0365
	80,3		,22	365
	80,3		2,2	36,5
	80,3		22	3,65
	222		,365	608,21+
	222		3,65	60,821+
	222		365	,60821+

As multiplying by 10, 100, 1000, &c. is only removing the separating point of the multiplicand so many places to the right hand, as there are ciphers in the multiplier, so to divide by the same, is only removing the separatrix, in the same manner, to the left.

REDUCTION OF DECIMALS.

Case I.

To reduce a vulgar fraction to its equivalent decimal.

Rule. Divide the numerator by the denominator, and the quotient will be the decimal required.

Examples.

1. Reduce $\frac{3}{4}$ to a decimal.

4)3,00

Ans. ,75

2. What is the decimal of $\frac{1}{2}$? Ans. ,5.
3. What is the decimal of $\frac{1}{4}$? Ans. ,25.
4. What is the decimal of $\frac{3}{20}$? Ans. ,15.
5. What is the decimal of $\frac{17}{25}$? Ans. ,68.
6. Express $\frac{7}{8}$ decimally. Ans. ,875.

Case II.

To reduce numbers of different denominations to their equivalent decimal values.

Rule. 1. Write the given numbers perpendicularly under one another for dividends, proceeding orderly from the least to the greatest.

2. Opposite to each dividend, on the left hand, place such a number for a divisor as will bring it to the next superior name, and draw a line between them.

3. Begin with the highest, and write the quotient of each division, as decimal parts, on the right hand of the dividend next below it, and the last quotient will be the decimal sought.

Examples.

1. Reduce 14*s.* 5½*d.* to the decimal of a pound.

4	2
12	5,5
20	14,4583

Ans. ,7229

2. Reduce 15 shillings to the decimal of a pound. Ans. ,75.
3. Reduce 3 qrs. 18 lb. to the decimal of a cwt. Ans. ,910714+
4. Reduce 2 qrs. 2 nails to the decimal of a yard. Ans. ,625.
5. Reduce 14 gals. 3 quarts to the decimal of a hogshead. Ans. ,2341+

Case III.

To find the decimal of any number of shillings, pence, and farthings, by inspection.

Rule. Write half the greatest even number of shillings for the first decimal figure, and let the farthings, in the given pence and farthings, possess the second and third places; observing to increase the second place by 5, if the shillings be odd, and the third place by 1, when the farthings exceed 12, and by 2 when they exceed 37.

Examples.

1. Find the decimal of 13*s*. 9¾*d*. by inspection.

,6	half of 12*s*.
5	for the odd shilling.
39	farthings in 9¾*d*.
2	for excess of 37.
,691	

2 Find by inspection the decimal of 15*s*. 8½*d*. 9*s*. 3½*d*. 19*s*. 6¾*d*. 3*s*. 6*d*. and 2*s*. 11½*d*. Ans. ,784 ,465 ,978 ,175 ,148.

Case IV.

To find the value of any given decimal in the terms of the integer.

Rule. 1. Multiply the decimal by the number of parts in the next lowest denomination, and cut off as many places for the remainder to the right hand as there are places in the given decimal.

2. Multiply the remainder by the parts in the next inferior denomination, and cut off a remainder as before.

3. Proceed in this manner through all the parts of the integer, and the several denominations, standing on the left hand, make the answer.

Examples.

1. Find the value of ,691 of a pound.

,691	
20	
13,820	
12	
9,840	
4	
3,360	Ans. 13*s*. 9¼*d*.

2. What is the value of ,9 of a shilling? Ans. 10¾*d.*
3. What is the value of ,592 of a cwt.?
Ans. 2 qrs. 10 lb. 4 oz. 13+drs.
4. What is the value of ,258 of a tun of wine?
Ans. 1 hhd. 2+galls.
5. What is the value of ,12785 of a year?
Ans. 46 days 15 hours 57 minutes 57+sec.

SINGLE RULE OF THREE DIRECT.

THE SINGLE RULE OF THREE DIRECT teaches, from three numbers given, to find a fourth, that shall be in the same proportion to the third, as the second is to the first.

If *more* require *more*, or *less* require *less*, the proportion is direct.

RULE. Write down the number which is of the same name or kind with the answer for the second term. Consider whether the answer ought to be greater or less than this number; then, if greater, write down the greater of the remaining numbers on the right of it, for the third term, but if less, make the less of those numbers the third term; and on the left of the second term, write down the remaining number for the first term.

Reduce the first and third numbers into the same, and the second into the lowest denomination mentioned.

2. Multiply the second and third numbers together, and divide the product by the first, and the quotient (if there be no remainder) is the answer, or fourth number required.

If, after division, there be a remainder, reduce it to the next denomination below that to which the second number was reduced, and divide by the same divisor as before, and the quotient will be of this last denomination. Proceed thus with all the remainders till you have reduced them to the lowest denomination which the second number admits of, and the several quotients taken together will be the answer required.

The method of proof is by reversing the question.

EXAMPLES.

1. If 2 yards of cloth cost 4*s.* what will 125 yards come to?

yds.	*s.*	*yds.*
2	: 4 : :	125
		4
		2)500
		20)250
		Ans. £12 10

Proof:

yds	£.	*s.*	*yds.*
125	: 12	10	: : 2
		20	
		250	
		2	
		125)500(4 shillings.	
		500	

2. When 891 gallons of oil cost £176 6 10½, how many gallons may be bought for 13*s.* 10½?

£176 6 10½	:	*gall.* 891	: :	13 10½
20		665		12
3526*s.*		4455		166
12		5346		4
42322*d.*		5346		665 farthings.
4		592515(3 gallons.		
169290*f.*		507870		
		84645		
		4		
		169290)338580(2 quarts.		
		338580		Ans. 3½ gallons.

3. 871 yards	: $78,39	: : 29 yards	Ans.	$2,61
4. 1¾ "	: ,42	: : 87½ "		21,00
5. 794½ "	: £8 5 6½	: : 5 "		1*s*0½
6. 6½*d.*	: 1¼ yard	: : £10 6 8		496 yards.
7. 1 lb.	: 17¾ cts.	: : 2 cwt. 1 qr. 21 lbs.		$48,45¾cts.
8. £23 14 3	: 19 yards	: : £142 5 6		114 yards.
9. 6 lbs. 8 oz. 4 dts.	: £21 6 5	: : 40 lbs. 1 oz. 4 dwts.		£127 18 6

The former method of stating is familiarly known, but it is more consistent with the theory of Proportion, to place the number that is of the same kind with the answer for the third term, as in the following examples.

10. 7 cwt.3 qrs.15 lbs.	: 1 qr. 21 lbs.	: : £33 2 3	Ans.	£1 16 9
11. £24 4 8½	: £141 13 10½	: : 117½ yds.		687 yards.
12. 3⅜ lbs.	: 3 qrs.17lb. 8oz.	: : $3,51 cts.		$105,56
13. £9 0 10	: £89 5 8¾	: : 1 cwt. 9 cwt. 3 qrs. 14 lb.		
14. $163,35 cents.	: $3,15 cents.	: : 12 cwt. 3 qrs. 24 lb.		28 lbs.

15. B. owes £2119 17*s.* 6*d.* and he is worth but £1324 18*s.* 8½*d.*; if he delivers this to his creditors, how much do they receive on the pound? Ans. 12*s.* 6*d.*

16. How many crowns of 110 cents each will pay a debt of £82 16*s.* 7½*d.* N. E.? Ans 251 crowns.

17. If 203 tons 9 cwt. 3 qrs. 3 lbs. of tallow cost £4558 3*s.* 0*d.* what does 1 ton cost? Ans. £22 8 0

18. How many cwt. of rice may be bought for 487 dols. 50 cts. when 7 lb. cost 25 cents? Ans. 121 cwt. 3 qrs. 14 lb.

19. A captain of a ship is provided with 18000 lb. of bread for 150 seamen, of which each man eats 4 lb. per week, how long will it last them? Ans. 30 weeks.

20. How long would 2295 lb. of beef last for 45 seamen, if they get 1 lb. each, and that 3 times a week?. Ans. 17 weeks.

21. Suppose 120 seamen are provided with 7200 gallons of water for a cruise of 4 months, each month 30 days; how much is each man's share per day? Ans. 2 quarts.

22. A ship's company of 16 men is on allowance of 6 ounces of bread per day, when meeting with a vessel from which they are supplied with 2 cwt. of bread, what addition will this make to their daily allowance, if they suppose their voyage to last 28 days? Ans. 8 ounces.

23. A person failing in trade owes, viz. to A. $818,73; B. $3673,46; C. $1800,40; D. $117,41 and to E. 814,50; and his property, worth $4009,59¾ cts. he gives up to his creditors; how much does he pay on the dollar, and what is E's loss on receiving his dividend?

Ans. He pays 55½ per dollar—E's loss is $362,45¼.

The following examples apply to the Percentage Calculations, viz. Interest, Commission, Discount, Insurance, &c. &c.

24.	If	$100	$6	$456,50	Ans. $27,39
25.		"	5	123,60	6,18
26.		"	2½	268,40	6,71
27.		"	17	190,	32,30
28.		"	25	94.80	23,70
29.		"	⅝	760,	4,75
30.	If	$100	$2,50*	648 lbs.	16,20
31.		"	3.25	2744 "	89,18
32.		"	3,	579 "	17,37

* $2,50 per cent.=2½ cents per lb.

33. If	£100	£6	£96	Ans.	£5 15	$2\frac{1}{4}$
34.	"	5	87		4 7	0
35.	"	$2\frac{1}{2}$	75		1 17	6
36.	"	17	286		48 12	$4\frac{3}{4}$
37.	"	25	392 18 4		98 4	7
38.	"	$33\frac{1}{3}$	73 2 6		24 10	10
39.	"	$\frac{7}{8}$	128		1 2	$4\frac{3}{4}$
40.	"	$5\frac{4}{5}$	95 11 9		5 7	6
41.	"	$1\frac{3}{4}$	144		2 10	$4\frac{3}{4}$
42.	"	$17\frac{1}{2}$	19 12 3		3 8	$7\frac{1}{2}$

43. A farm of 48 acres is owned, viz.—A $\frac{1}{2}$, B $\frac{1}{6}$, C $\frac{1}{3}$, and D, the remainder. What is he to receive for his part, if the whole was sold for $918? Ans. $357.

44. A owns $\frac{1}{3}$ of a farm of 108 acres, B $\frac{1}{6}$ of it, C $\frac{1}{3}$, and D the remainder. If D sold his part for $714, what was the farm valued at? Ans. $1836.

45. A owes B $87,52, for which B agrees to take land at $25,60 per acre. How much land is B to have?
Ans. 3 A. 1 R. 27 ps.

46. How much will 18 thousand, 8 hundred and 36 Casts of staves come to at $12 per thousand?

NOTE. Staves are counted by casting 3 at a time; 40 casts make 1 hundred, and 10 hundred 1 thousand.

m.	$		*m.*	*h.*	*cs.*
1	12	: :	18	8	36
10			10		
10			188		
40			40		
400			7556		
			12		
			400)906,72		
			2	,68	

The work may be abridged by dividing the casts by 4, and annexing the quotient as a decimal to the hundreds, thus,

18 8 36

18,89
12

Ans. $226,68

Also—13 thousands, 3 hundreds 26 casts at $40.

13,365
40

$534,600 Ans. $534,60.

5	3	27	-	14,80	-	79,44
0	7	29	-	12,50	-	9,65½
8	3	23	-	14,00	-	117,00½
8	7	30	-	45,00	-	394,87½
3	6	18	-	50,00	-	182,25
1	1	25	-	18,00	-	20,92½

47. What will 56 bundles of hoops come to at 25 dols. per M. of 30 bundles?

NOTE. Hoops are sometimes bound in bundles of 30 hoops each, and 4 such bundles are 1 hundred, and 10 hundred or 40 bundles, 1 thousand. But they are generally bound in bundles of 40 each, 3 bundles making 1 hundred, and 10 hundred or 30 bundles, 1 thousand.

3)56

hund. dols.

If 10 : 25 : : 18⅔

25

90

36

16⅔

1|0)46|6⅔

46,6⅔

Or hundreds

bund. dols. bund.

30 : 25 : : 56

25

280

112

3|0)140|0

46,66⅔

Ans. 46 dols. 6⅔ dimes, or 66⅔ cts.

48. How many bushels of salt, at 4 dols. 75 cts. per hhd. can I have for 326 dollars?

\$ *cts. bush.* \$

If 4 75 : 8 : : 326 Ans. 549 bushels, when measured on board the vessel.

If 4 75 : 7½ : : 326 Ans. 514 bushels three pecks, nearly, when measured ashore.

49. What is the tax on lands, &c. valued at 2957 dols. in the direct tax, at 28 cents and 3 mills on the 100 dollars?

Ans. 8 dols. 36 cts. 8 ms.

50. What is the tax on 753 dollars at $\frac{3}{10}$ per cent.?

753 dollars.
3 mills

2259 mills. Ans. 2 dols. 25 cts. 9 ms.

51. Find the tax on the following sums—

	dls		*dls. cts.*
viz.	1550 at $\frac{4}{10}$ per cent - - -	Ans.	6 20
	4560 $\frac{5}{10}$ - - - - - -		22 80
	7850 $\frac{6}{10}$ - - - - - - -		47 10
	12680 $\frac{7}{10}$ - - - - - -		88 76

52. What will a piece of land, measuring 48 feet length and 40 in width at each end, amount to at 20 dollars per square rod?

feet.
48
40
1920

feet. *dols.*
If $272\frac{1}{4}$: 20 : : 1920

By decimals.

If 272,25 : 20 : : 1920

Ans. 141 dols. 4 cents.

53. A charter party for a vessel of 186 tons commenced on 28th of May, and ended on the 10th of October following. What does the hire amount to for that time, at 2 dols. per ton per month of 30 days?

	days.
May - -	4
June - -	30
July - -	31
August -	31
September	30
October -	10
	136

186 tons
2 dols. per mo.

days.
If 30 : 372 : : 1.36
136
2232
1116
372
3,0)5059,2
1686,40

Ans. 1686 dols. 40 cts.

In calculating the time, the days of receiving and discharging the vessel are *both* included.

INVERSE PROPORTION.

WHEREAS in the Rule of Three Direct, more requires more, and less requires less, in this rule more requires less and less requires more.

RULE. After stating the terms as in the Rule of Three Direct, multiply the first and second terms together, and divide the product by the third, and the quotient is the answer.

EXAMPLES.

1. If 100 workmen complete a piece of work in 12 days, how many are sufficient to do it in 3 days?

d. *m.* *d.*
12 : 100 : : 3
12

3)1200

400 Ans. 400 men.

2. If 8 boarders drink a barrel of cider in 12 days, how long would it last if 4 more came among them?
Ans. 8 days.

3. A ship's company of 15 persons is supposed to have bread to last their voyage, allowing each 8 ounces per day—when they picked up a crew of 5 persons in distress, to whom they are willing to communicate, what will the daily allowance of each person then be? Ans. 6 ounces.

4. When wheat is sold at 93 cents per bushel, the penny loaf weighs 12 ounces—what must it weigh when the wheat is 1 dollar 24 cents per bushel? Ans. 9 ounces.

5. How many yards of baize, 3 qrs. wide, will line a cloak which has in it 12 yds. of camblet, half yard wide?
Ans. 8 yards.

6. Suppose 400 men in a garrison are provided with provisions for 30 days, how many men must be sent out, if they would have the provisions last 50 days? Ans. 160 men.

7. What sum should be put to interest to gain as much in 1 month, as 127 dollars would gain in 12 months?
Ans. 1524 dols.

8. If a head of 7 feet of water with 30 mill powers will reduce a pond of 200 acres, 8 inches in a day, how much will a head of 6 feet reduce it in the same time?

7 : 8 : : 6
7

6)56

Ans. $9\frac{1}{3}$ inches.

9. If 30 mill powers would reduce a pond of 7 feet head $7\frac{1}{2}$ inches in a day, how much would they reduce a pond of 6 feet $6\frac{3}{4}$ inches head, in the same time?

7 ft. : $7\frac{1}{2}$: : 6 $6\frac{3}{4}$
84 $78\frac{3}{4}$ inches.
4 4
336 : $7\frac{1}{2}$: : 315
$7\frac{1}{2}$
2352
168
315)2520(8
2520.

Ans. 8 inches.

COMPOUND PROPORTION

Teaches to resolve such questions, as require two or more statings by Simple Proportion.

Rule. State the question, by placing the three conditional terms in this order: that which is the principal cause of gain, loss, or action, possesses the first place; that which denotes space of time or distance of place the second; and that which is the gain, loss, or action, the third: then place the other two terms, which move the question, under those of the same name, and if the blank place fall under the third, multiply the three last terms for a dividend, and the two first for a divisor; but if the blank fall under the first or second place, multiply the first, second and last terms together for a dividend, and the other two for a divisor; and the quotient will be the answer.

EXAMPLES.

1. If £100 in 12 months gain £5, how much will £400 gain in 3 months?

£		mo.		£
100	:	12	: :	5
400	:	3		
3				

100 × 1200
12 × 5

12|00)60|00

£5 Ans. £5.

2. If 8 men make 24 rods of wall in 6 days, how many men will build 18 rods in 3 days?

m.		d.		r.
8	:	6	: :	24
		3		18
				6

24 × 108
3 × 8

72)864(12
72

144
144 Ans. 12 men.

The answer may be found by two distinct operations, thus,

3. If a basin of 190 acres would rise 10 inches in 12 hours, how high would a basin of 50 acres rise in 10 hours, with the same head of water?

acres.		inches.		acres.
190	:	10	: :	50
10				

50)1900

38 inches.

12 : 38 : : 10 hours.
10

12)380

Ans. $31\frac{2}{3}$ inches.

4. In what time would it rise to 38 inches?

inches. hours. inches.

$$31\tfrac{1}{3} : 10 :: 38$$
$$3 \qquad\qquad 3$$

$$95 : 10 :: 114$$
$$10$$

$$95)1140$$

Ans. 12 hours.

5. Suppose a wall 40 feet high and two feet thick, has a sufficient foundation of three feet in width. What should be the breadth of the foundation of a wall, 50 feet high and $2\frac{1}{2}$ feet thick, upon a like bed of earth?

Ans. 4 ft. $8\frac{1}{4}$ inches.

6. If 12 oxen eat up $3\frac{1}{3}$ acres of grass in 4 weeks, and 21 oxen eat 10 acres in 9 weeks; how many oxen will eat up 24 acres in 18 weeks, the grass being supposed to grow uniformly?

ox. wks. acr.

$$12 : 4 :: 3\tfrac{1}{3}$$
$$18 \quad 10$$

$$18\times 3\tfrac{1}{3}=60)480$$

Ans. 8 oxen, the number which will eat up 10 acres in 18 weeks, supposing the grass not to grow—Now by the question, 21 oxen can eat only 10 acres in 9 weeks, (on account of the growth of the grass,) whereas by the work, if the grass had not grown, 16 oxen could have eaten it in the same time; (for 8 oxen in 18 weeks is the same as 16 oxen in 9 weeks) it is evident therefore, that the extra growth of 10 acres of grass for the last 5 weeks, (the excess of 9 weeks above 4 weeks,) will feed 5 oxen, (the excess of 21 above 16) for 9 weeks, or which is the same thing, $2\frac{1}{2}$ oxen, for 18 weeks—Again by the Rule of Three—If 5 weeks: the excess of 9 above 4, will feed $2\frac{1}{2}$ oxen :: how many will 14 feed, the excess of 18 above 4—

wks. oxen. wks.

thus $5 : 2\frac{1}{2} :: 14 : 7$ oxen, which the *extra* growth of grass would feed,
Again 8 oxen would eat the grass without growing;

15, Consequently 15 oxen would eat all the 10 acres.

Lastly, If 10 *acres.* would feed 15 *oxen.* how many *acres.* will 24 feed?

15

10)360

Ans. 36 oxen.

VULGAR FRACTIONS.

Fractions, or broken numbers, are expressions for any assignable parts of an unit; and are represented by two numbers, placed one above the other, with a line drawn between them.

The number above the line is called the *numerator*, and that below the line the *denominator.*

The denominator shows how many parts the integer is divided into, and the numerator shows how many of those parts are meant by the fraction.

Fractions are either proper, improper, compound or mixed.

1st. A *proper fraction* is when the numerator is less than the denominator, as $\frac{1}{3}$, $\frac{2}{3}$, $\frac{9}{11}$, $\frac{53}{100}$, &c.

2d. An *improper fraction* is when the numerator is either equal to or greater than the denominator, as $\frac{3}{3}$, $\frac{11}{9}$, $1\frac{2}{3}$, $3\frac{5}{20}$, &c.

3d. A *compound fraction* is a fraction of fractions, and known by the word *of*, as $\frac{1}{2}$ of $\frac{2}{3}$, $\frac{7}{9}$ of $\frac{9}{10}$, $\frac{15}{16}$ of $2\frac{1}{2}$, &c.

4th. A *mixed number* or *fraction* is composed of a whole number and a fraction, as $8\frac{3}{4}$, $17\frac{1}{2}$, $29\frac{2}{4}$, &c.

1. *To reduce a simple fraction to its lowest terms.*

Rule. Find a common measure by dividing the lower term by the upper, and that divisor by the remainder, continuing till nothing remains; the last divisor is the common measure; then divide both parts of the fraction by the common measure, the quotients express the fraction required.

Note. If the common measure happens to be 1, the fraction is already in its lowest term; and when a fraction hath ciphers at the right hand, it may be abbreviated by cutting them off, as $\frac{1}{2}\frac{0}{0}$.

EXAMPLES.

1. Reduce $\frac{91}{117}$ to its lowest term.

91)117(1
91

26)91(3
78

Common measure 13)26(2
26

13)$\frac{91}{117}$($\frac{7}{9}$ the answer.

Or, divide the terms of the fractions by any number that will divide them without a remainder; divide the quotients in the same manner, and so on, till no number will divide them both, and the last quotients express the fraction in its lowest terms.

EXAMPLES.

2. Reduce $\frac{192}{576}$ to its lowest terms.

(8) (8) (3)
192 24 3 1
576 72 9 3 the answer.

3. Reduce $\frac{144}{576}$ to its lowest terms. Ans. $\frac{1}{4}$.

II. *To reduce a mixed number to an improper fraction.*

RULE. Multiply the whole numbers by the denominator of the fraction, and to the product add the numerator for a new numerator, and place it over the denominator.

NOTE. To express a whole number fraction-wise, set one for a denominator to the given number.

EXAMPLES.

1. Reduce $5\frac{3}{8}$ to an improper fraction.

$5\times8+3=\frac{43}{8}$ the answer.

2. Reduce $183\frac{5}{11}$ to an improper fraction. Ans. $^{2}\frac{0}{1}\frac{1}{1}\frac{8}{1}$.

EXAMPLES.

1. Reduce $\frac{17}{5}$ to its proper terms.

5)17($3\frac{2}{5}$ the answer.
15

2

2. Reduce $^{2}4^{5}_{8}$ to its proper terms. Ans. $27\frac{5}{8}$.

IV. *To find the least common multiple or denominator.*

RULE. Divide the given denominators by any number that will divide two or more of them without a remainder, and set the quotients and the undivided numbers underneath. Divide these quotients and undivided numbers by any number that will divide two or more of them as before, and thus continue, till no two numbers are left capable of being lessened.

Multiply the last quotients and the divisor or divisors together, and the product will be the least common denominator required.

EXAMPLES.

1. What is the least common measure of $\frac{4}{9}$, $\frac{7}{8}$, $\frac{6}{15}$, and $\frac{3}{16}$?

8)9 8 15 16
3)9 1 15 2
3 1 5 2

3×5×2=30×3×8=720 Ans.

2. What is the least number that can be divided by the nine digits without a remainder. Ans. 2520.

V. *To reduce vulgar fractions to a common denominator.*

RULE. Find a common denominator by the last case, in which divide each particular denominator, and multiply the quotient by its own numerator, for a new numerator, and the new numerators, being placed over the common denominator, express the fractions required in their lowest terms.

EXAMPLES.

1. Reduce $\frac{3}{4}$, $\frac{4}{9}$, and $\frac{7}{12}$ to a common denominator.

36 the com. denom.

4	9×3=27
9	4×5=20
12	3×7=21

The fractions will be $\frac{27}{36}$, $\frac{20}{36}$, $\frac{21}{36}$.

2. Reduce $\frac{1}{2}$, $\frac{2}{3}$, $\frac{5}{8}$ and $\frac{7}{12}$ to a common denominator.

Ans. $\frac{12}{24}$, $\frac{16}{24}$, $\frac{20}{24}$, and $\frac{21}{24}$.

VI. *To reduce a compound fraction to a single one.*

RULE. Multiply all the numerators for a new numerator, and all the denominators for a new denominator, then reduce the new fraction to its lowest term by Case I.

EXAMPLES.

1. Reduce $\frac{3}{4}$ of $\frac{5}{6}$ of $\frac{9}{10}$ to a single fraction.

$$3\times5\times9=135 \quad 9,$$
$$\text{——}=\text{——the answer.}$$
$$4\times6\times10=240 \quad 16$$

2. Reduce $\frac{5}{8}$ of $\frac{4}{7}$ of $\frac{1}{12}$ to a single fraction. Ans. $\frac{5}{168}$.

3. Reduce $\frac{2}{7}$ of $\frac{5}{8}$ of $\frac{4}{5}$ to a single fraction. Ans. $\frac{2}{7}\frac{0}{3}$.

VII. *To reduce a fraction of one denomination to the fraction of another, but greater, retaining the same value.*

RULE. Reduce the given fraction to a compound one, by multiplying it with all the denominations between it and that denomination, to which you would reduce it; then reduce that compound fraction to a single one.

EXAMPLES.

1. Reduce $\frac{7}{8}$ of a penny to the fraction of a pound.

$$\text{—} \quad \frac{d.}{7\times1\times1} \quad 7$$
$$\text{——}=\text{——the answer.}$$
$$8\times12\times20 \quad 1920$$

2. Reduce $\frac{4}{5}$ of a pennyweight to the fraction of a pound Troy. Ans. $\frac{1}{3000}$.

VIII. *To reduce a fraction of one denomination to the fraction of another, but less, retaining the same value.*

RULE. Multiply the numerator by the parts contained in the several denominations between it and that denomination to which you would reduce it for a new numerator, and place it over the denominator of the given fraction.

EXAMPLES.

1. Reduce $\frac{1}{960}$ of a pound to the fraction of a penny.

$$1\times20\times12=240$$
$$\text{——}=\frac{1}{4} \text{ the answer.}$$
$$960$$

2. Reduce $\frac{1}{3000}$ of a lb. Troy to the fraction of a dwt. Ans. $\frac{4}{5}$.

IX. *To find the value of the fraction in the known parts of the integer.*

RULE. Multiply the numerator by the known parts of the integer and divide by the denominator.

EXAMPLES.

1. What is the value of $\frac{3}{4}$ of a £?

2

20 shillings.

3)40

Ans. 13*s.* 4*d.*

2. What is the value of $\frac{2}{3}$ of a shilling? Ans. 4*d.* $3\frac{1}{3}$ *qrs.*

3. Reduce $\frac{3}{4}$ of a lb. Troy to its proper quantity.

Ans. 7 oz. 4 dwt.

X. *To reduce any given quantity to the fraction of a greater denomination of the same kind.*

RULE. Reduce the given quantity to the lowest denomination mentioned for a new numerator, under which set the integral part (reduced to the same name) for a denominator, and it will express the fraction required.

EXAMPLES.

1. Reduce 16*s.* 8*d.* to the fraction of a pound.

16 8

12

200 5

——=—the answer.

240 6

2. Reduce 2 quarters $3\frac{1}{2}$ nails to the fraction of an ell English. Ans. $\frac{5}{8}$.

ADDITION OF VULGAR FRACTIONS.

I. *To add fractions that have a common denominator.*

RULE. Add their numerators together, and place the sum over one of the given denominators.

EXAMPLES.

1. Add $\frac{1}{9}$, $\frac{2}{9}$, $\frac{4}{9}$, $\frac{5}{9}$ and $\frac{7}{9}$ together.

1

2

4

5

7

19

——=$2\frac{1}{9}$ the answer.

9

2. Add $\frac{7}{24}$, $\frac{11}{24}$, and $\frac{13}{24}$ together. Ans. $1\frac{7}{24}$.
3. Add $\frac{13}{20}$, $\frac{17}{20}$, and $\frac{9}{20}$ together. Ans. $1\frac{9}{20}$.

II. *To add mixed numbers, whose fractions have a common denominator.*

RULE. Add the fractions by the last case, and the integer as in whole numbers.

EXAMPLES.

1. Add $2\frac{1}{11}$, $3\frac{2}{11}$, $4\frac{5}{11}$, and $7\frac{9}{11}$ together.

$2\frac{1}{11}$
$3\frac{2}{11}$
$4\frac{5}{11}$
$7\frac{9}{11}$

$17\frac{5}{11}$ answer.

2. Add $13\frac{1}{15}$, $9\frac{4}{15}$, and $3\frac{7}{15}$ together. Ans. $25\frac{4}{5}$.
3. Add $1\frac{1}{12}$, $2\frac{5}{12}$, $3\frac{7}{12}$, and $4\frac{11}{12}$ together. Ans. 12.

III. *To add fractions, having different denominators.*

RULE. Find the least common denominator by Case IV. in Reduction, in which divide each denominator, and multiply the quotient by its numerator; the sum of the products is a new numerator to the common denominator, and the fraction required.

EXAMPLES.

1. Add $\frac{2}{3}$, $\frac{3}{4}$, $\frac{4}{6}$, $\frac{7}{8}$ and $\frac{11}{12}$ together.

24 com. denominator.

3	8× 2=16
4	6× 3=18
6	4× 5=20
8	3× 7=21
12	2×11=22

$\frac{97}{24}=4\frac{1}{24}$ the answer.

2. Add $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{7}$ and $\frac{1}{8}$ together. Ans. $1\frac{61}{280}$.
3. Add $\frac{2}{3}$, $\frac{4}{5}$, $\frac{6}{7}$, $\frac{3}{8}$, and $\frac{8}{15}$ together. Ans. $3\frac{47}{168}$.

IV. *To add mixt numbers, whose fractions have different denominators.*

RULE. Add the fractions as in the last case, and the integers as in whole numbers.

EXAMPLES.

1. Add $5\frac{2}{3}$, $6\frac{7}{8}$, and $4\frac{1}{2}$ together.

24 com. denom.

$5\frac{2}{3}$	16
$6\frac{7}{8}$	21
$4\frac{1}{2}$	12
Ans. $17\frac{1}{24}$	$\frac{49}{24}=2\frac{1}{24}$.

2. Add $1\frac{3}{5}$, $\frac{4}{5}$, of $\frac{1}{5}$, and $9\frac{3}{20}$ together. Ans. $11\frac{1}{20}$.
3. Add $1\frac{9}{10}$, $6\frac{1}{4}$, $\frac{3}{4}$, of $\frac{1}{2}$, and $7\frac{1}{2}$ together. Ans. $16\frac{7}{10}$.

V. *When the fractions are of several denominations.*

RULE. Reduce them to their proper quantities by Case IX. in Reduction, and add as before.

EXAMPLES.

1. Add $\frac{7}{8}$ of a £ to $\frac{3}{10}$ of a shilling.

15 common measure.

	s.	d.	
$\frac{7}{8}$ of a £=	15	$6\frac{3}{5}$	10
$\frac{3}{10}$ of a s.=	0	$3\frac{3}{5}$	9
Ans.	15	$10\frac{4}{5}$	$\frac{19}{15}=1\frac{4}{15}$.

2. Add $\frac{2}{3}$ of a yard, $\frac{3}{4}$ of a foot, and $\frac{7}{8}$ of a mile together.
Ans. 1540 yds. 2 ft. 9 in.
3. Add $\frac{1}{3}$ of a week, $\frac{1}{4}$ of a day, and $\frac{1}{2}$ of an hour together.
Ans. 2 days, $14\frac{1}{2}$ hours.

SUBTRACTION OF VULGAR FRACTIONS.

I. *To find the difference between simple fractions that have a common denominator.*

RULE. Subtract the less numerator from the greater, and under the remainder put the denominator.

EXAMPLES.

From	$\frac{5}{7}$	$1\frac{1}{12}$	$\frac{16}{10}$	$\frac{17}{32}$	$\frac{105}{200}$
Take	$\frac{2}{7}$	$\frac{5}{12}$	$\frac{3}{10}$	$\frac{18}{32}$	$\frac{90}{200}$
Rem.	$\frac{3}{7}$	$\frac{1}{2}$	$\frac{2}{4}$	$\frac{4}{32}$	$\frac{15}{200}$

II. *To subtract a fraction or mixt number from a whole number.*

RULE. Subtract the numerator from the denominator, and under the remainder put the denominator, and carry one to be deducted from the integer.

EXAMPLES.

From	3	6	10	9	100
Take	$0\frac{3}{16}$	$0\frac{7}{8}$	$0\frac{1}{10}$	$5\frac{1}{2}$	$99\frac{99}{100}$
Rem.	$2\frac{13}{16}$	$5\frac{1}{8}$	$9\frac{9}{10}$	$3\frac{1}{2}$	$0\frac{1}{100}$

III. *To subtract simple fractions that have no common denominator.*

RULE. By Case IV. in Reduction, find the common denominator, in which divide each denominator, and multiply the quotient by its numerator; the difference between the products thus found is a numerator to the common denominator, and the answer required.

EXAMPLES.

From $\frac{17}{21}$ take $\frac{9}{14}$.

42 com. denom.

21 $2\times17=34$
14 $3\times 9=27$

Rem. $\frac{7}{42}=\frac{1}{6}$, the answer.

From	$\frac{5}{6}$	$\frac{11}{12}$	$\frac{5}{6}$	$\frac{9}{15}$	$\frac{211}{216}$
Take	$\frac{1}{2}$	$\frac{8}{4}$	$\frac{4}{7}$	$\frac{2}{216}$	$\frac{7}{144}$
Rem.	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{36}$	$\frac{1}{12}$	$\frac{203}{432}$

In order to distinguish the greater of two fractions, let them be reduced to a common denominator, as in Case V. in Reduction; and that fraction, whose numerator is greater, is the greater fraction; the difference between the new numerators, being set over the common denominator, will show the excess or inequality.

EXAMPLE.

Which of the two is the greater fraction, $\frac{11}{12}$ or $\frac{15}{16}$?

48 com. denom.

12 $4\times11=44$
16 $3\times15=45$

Ans. $\frac{15}{16}$ is greater by $\frac{1}{48}$.

IV. *To subtract a fraction or mixt number from a mixt number, when the fractional part to be subtracted is greater than that from which it is to be subtracted.*

RULE. Find a common denominator and a new numerator, as in the last case, and then subtract the numerator of the

greater fraction from the common denominator, and to the remainder add the less numerator, and set the sum of both for a new numerator over the common denominator, and carry one to the integral part, and proceed as in whole numbers.

EXAMPLES.

		27 common denominator.
From	$13\frac{1}{9}$	$3\times 1 = 3$
Take	$8\frac{14}{27}$	$1\times 14 = 14$
	$4\frac{13}{27}$	$\frac{17}{27}$

From	$6\frac{4}{7}$	$10\frac{3}{15}$	$12\frac{5}{12}$	$19\frac{5}{11}$
Take	$0\frac{6}{7}$	$1\frac{7}{12}$	$6\frac{1}{2}$	$0\frac{7}{12}$
Rem.	$5\frac{4}{7}$	$8\frac{13}{60}$	$5\frac{11}{12}$	$18\frac{143}{132}$

V. *When the fractions are of different denominations.*

RULE. Reduce them to their proper quantities, and subtract as before.

EXAMPLES.

1. From $\frac{7}{9}$ of a £ take $\frac{3}{15}$ of a shilling.

	s.	d.	15 common denominator.
$\frac{7}{9}$ of a £ =	15	$6\frac{2}{3}$	10
$\frac{3}{15}$ of a s. =	0	$3\frac{3}{5}$	9
Rem.	15	$3\frac{1}{15}$	

2. From $\frac{3}{4}$ of a £ take $\frac{2}{4}$ of a shilling. Ans. 14*s*. 3*d*.
3. From $\frac{2}{4}$ of a lb. Troy take $\frac{1}{6}$ of an ounce. Ans. 8 oz. 16 dwt. 16 grs.
4. From 7 weeks take 9 $\frac{7}{10}$ days. Ans. 5w. 4d. 7h. 12m.
5. From $\frac{1}{6}$ of a yard take $\frac{2}{3}$ of an inch. Ans. 5 inch. 1 bc.

MULTIPLICATION OF VULGAR FRACTIONS.

RULE. Reduce compound fractions to simple ones, and mixt numbers to improper fractions; then multiply the numerators together for a new numerator, and the denominators for a new denominator.

EXAMPLES.

1. Multiply $4\frac{1}{2}$ by $\frac{1}{8}$.

$$\frac{4\frac{1}{2}}{2}$$

$$\frac{9\times1}{2\times8}=\frac{9}{16}$$ the answer.

2. Multiply $\frac{3}{8}$ by $\frac{4}{5}$. Ans. $\frac{3}{10}$.
3. Multiply $\frac{7}{9}$ by $\frac{3}{5}$. Ans. $\frac{14}{21}$.
4. Multiply $48\frac{3}{4}$ by $13\frac{1}{3}$. Ans. $672\frac{3}{16}$.

DIVISION OF VULGAR FRACTIONS.

RULE. Prepare the fractions, if necessary; then invert the divisor, and proceed as in Multiplication.

EXAMPLES.

1. Divide $\frac{4}{7}$ by $\frac{2}{3}$.

$$\frac{4\times3}{7\times2}=1\frac{2}{14}=\frac{6}{7}$$ the answer.

2. Divide $3\frac{1}{6}$ by $9\frac{1}{2}$.

$$\frac{3\frac{1}{6}}{6}\qquad\frac{9\frac{1}{2}}{2}$$

$$\frac{19}{6}\qquad\frac{19}{2}$$

Then $\frac{19\times2}{6\times19}=\frac{38}{114}=\frac{1}{3}$ the answer.

3. Divide 5 by $\frac{7}{10}$. Ans. $7\frac{1}{7}$.
4. Divide $\frac{9}{10}$ by $4\frac{1}{2}$. Ans. $\frac{1}{5}$.

MISCELLANEOUS QUESTIONS

IN THE PRECEDING RULES.

1. What part is $28\frac{1}{12}$ of $33\frac{1}{3}$? Ans. $\frac{7}{8}$.
2. What will remain if $13\frac{4}{5}s.$ and $7\frac{1}{8}d.$ be taken from £1?
   Ans. $5s.\ 6\frac{3}{8}d.$
3. Which is the greater fraction $\frac{8}{15}$ or $\frac{9}{20}$?
   Ans. $\frac{8}{15}$ is greater by $\frac{1}{12}$.
4. Of what number is 176 the $\frac{11}{23}$ part? Ans. 368.

5. By how much must you multiply $13\frac{3}{5}$ that the product may be $49\frac{1}{7}$? Ans. $3\frac{3}{5}$.

6. A farmer being asked, how many sheep he had, answered, that he had them in 5 fields; in the first he had $\frac{1}{4}$ of his flock, in the second $\frac{1}{5}$, in the third $\frac{1}{6}$, in the fourth $\frac{1}{11}$, and in the fifth 450; how many had he? Ans. 1200.

RULE OF THREE DIRECT IN VULGAR FRACTIONS.

Rule. Having stated the question, make the necessary preparations as in Reduction of Fractions, and invert the first term; then proceed as in Multiplication of Fractions.

Examples.

1. If $\frac{1}{4}$ of a yard of cloth cost $\frac{2}{3}$ of a shilling, what will $\frac{7}{8}$ of a yard come to?

$$\text{If } \frac{1}{4}\text{ yd.} : \frac{2}{3}\text{ s.} :: \frac{7}{8}\text{ yd.}$$

inverted

$$\frac{4\times2\times7}{1\times3\times8} \text{ s.} = \frac{56}{24} = 2\text{s. } 4\text{d. the answer.}$$

2. If $\frac{3}{16}$ of a ship cost £273 2s. 6d. what are $\frac{5}{32}$ of her worth? Ans. £227 12s. 1d.

3. If $\frac{1}{4}$ of a yard cost $\frac{3}{5}$ of a pound, what will $\frac{2}{3}$ of an ell English come to, at the same rate? Ans. £2.

4. A person, having $\frac{1}{5}$ of a coal mine, sells $\frac{3}{4}$ of his share for £171; what is the whole mine valued at? Ans. £380.

SINGLE RULE OF THREE INVERSE IN VULGAR FRACTIONS.

Examples.

1. If $25\frac{1}{7}$s. will pay for the carriage of an cwt. $145\frac{1}{2}$ miles, how far may $6\frac{1}{2}$ cwt. be carried for the same money?

Ans. $22\frac{8}{13}$ miles.

2. If $3\frac{1}{2}$ yards of cloth that is $1\frac{1}{2}$ yard wide, be sufficient to make a cloak, how much must I have of that sort, which is $\frac{1}{3}$ yard wide to make another of the same bigness?

Ans. $4\frac{1}{2}$ yards.

3. If 3 men can do a piece of work in $4\frac{1}{2}$ hours, in how many hours will 10 men do the same work? Ans. $1\frac{7}{20}$.

4. If the penny white-loaf weigh 7 oz. when a bushel of wheat cost 5*s.* 6*d.* what is the bushel worth when the penny white-loaf weighs but $2\frac{1}{2}$ oz. Ans. 15*s.* $4\frac{4}{5}$*d.*

QUESTIONS FOR EXERCISE IN FRACTIONS.

1. How much is $\frac{5}{6}$ and $\frac{1}{16}$?
2. How much is $\frac{5}{6}$ of $\frac{1}{16}$?
3. Take $\frac{5}{6}$ from $\frac{1}{16}$.
4. Multiply $\frac{5}{6}$ by $\frac{1}{16}$.
5. Divide $\frac{5}{6}$ by $\frac{1}{16}$.
6. Divide $\frac{1}{16}$ by $\frac{5}{6}$.
7. Divide $\frac{1}{2}$ by $\frac{1}{4}$.
8. Divide $\frac{1}{4}$ by $\frac{1}{2}$.
9. Divide $\frac{1}{4}$ by 1.
10. Divide 1 by $\frac{1}{4}$.
11. How much is $\frac{1}{5}$ and $4\frac{2}{3}$?
12. How much is $\frac{1}{5}$ of $4\frac{2}{3}$?
13. Take $\frac{1}{5}$ from $4\frac{2}{3}$.
14. Multiply $4\frac{2}{3}$ by $\frac{1}{5}$.
15. Divide $4\frac{2}{3}$ by $\frac{1}{5}$.
16. Divide $\frac{1}{5}$ by $4\frac{2}{3}$.
17. Add $\frac{1}{5}$, $\frac{1}{6}$, $\frac{2}{3}$ of $7\frac{1}{4}$ and $\frac{3}{4}$ together.
18. Multiply $\frac{1}{3}$ of $5\frac{1}{2}$ by $\frac{7}{8}$.
19. Divide $\frac{3}{5}$ of $9\frac{1}{2}$ by $\frac{2}{3}$ of $1\frac{1}{2}$.
20. Reduce $\frac{1}{4}$*d.* $\frac{4}{5}\frac{1}{0}$ to the fraction of a penny.

Decimals.

21. Add nine tenths, ninety thousandths, four, and four hundredths, one hundred, and one thousandth together.
22. Take two hundred and seventeen thousandths from two thousand, and seventeen thousandths.
23. Multiply fifty-six, and 875 thousandths by one, and eight thousandths.
24. Divide fourteen, and one thousandth by fifty-four ten thousandths.

PRACTICE

Is a contraction of the Rule of Three Direct, when the first term happens to be an unit, or one, and has its name from its frequent use in business.

THE TABLE.

Parts of a £.			
s.	*d.*		
10		is	$\frac{1}{2}$
6	8	-	$\frac{1}{3}$
5		-	$\frac{1}{4}$
4		-	$\frac{1}{5}$
3	4	-	$\frac{1}{6}$
2	6	-	$\frac{1}{8}$
2		-	$\frac{1}{10}$
1	8	-	$\frac{1}{12}$
1		-	$\frac{1}{20}$

Parts of a Shilling.			
d.			
6	is	$\frac{1}{2}$	
4	-	$\frac{1}{3}$	
3	-	$\frac{1}{4}$	
2	-	$\frac{1}{6}$	
$1\frac{1}{2}$	-	$\frac{1}{8}$	
1	-	$\frac{1}{12}$	

Parts of a Ton.			
cwt.	*qr.*		
10		is	$\frac{1}{2}$
5		-	$\frac{1}{4}$
4		-	$\frac{1}{5}$
2	2	-	$\frac{1}{8}$
2		-	$\frac{1}{10}$
1		-	$\frac{1}{20}$

Parts of a Cwt.			
qrs.	*lbs.*		
2		is	$\frac{1}{2}$
1		-	$\frac{1}{4}$
	16	-	$\frac{1}{7}$
	14	-	$\frac{1}{8}$
	8	-	$\frac{1}{14}$
	7	-	$\frac{1}{16}$
	4	-	$\frac{1}{28}$
	2	-	$\frac{1}{56}$

Parts of a $\frac{1}{2}$ Cwt.			
lb.			
28	is	$\frac{1}{2}$	
14	-	$\frac{1}{4}$	
8	-	$\frac{1}{7}$	
7	-	$\frac{1}{8}$	
4	-	$\frac{1}{14}$	
$3\frac{1}{2}$	-	$\frac{1}{16}$	
2	-	$\frac{1}{28}$	

Parts of $\frac{1}{4}$ Cwt.			
lb.			
14	is	$\frac{1}{2}$	
7	-	$\frac{1}{4}$	
4	-	$\frac{1}{7}$	
$3\frac{1}{2}$	-	$\frac{1}{8}$	
2	-	$\frac{1}{14}$	
1	-	$\frac{1}{28}$	

CASE I.

When the price is an aliquot, or even part of a shilling.

RULE. Divide the given number by the part, and the quotient is the answer in shillings; what remains is to be reduced as in Compound Division.

EXAMPLES.

1. What will 4596 yards cost at 6*d.* per yard?

6*d.* $\frac{1}{2}$ | 4596

2|0 | 229|8

114 18 Ans. £114 18*s.*

	Yards.		d.			£	s.	d.
2.	3746	at	4	per yard.	Ans.	62	8	8
3.	1095	-	3	" "		13	13	9

Case II.

When the price is pence, or pence and farthings, and no even part of a shilling.

Rule. Find the even parts for the price, and proceed as in Case I. and the sum of the quotients is the answer.

Examples.

1. What will 4937 yards come to at 9*d.* per yard?

6	$\frac{1}{2}$	4937
3	$\frac{1}{2}$	2468 6
		1234 3
2|0		370|2 9

Ans. £185 2 9

	Yards.		d.			£	s.	d.
2.	2765	at	8	per yard.	Ans.	92	3	4
3.	3762	.	7	" "		109	14	6
4.	3159	.	$7\frac{1}{2}$	" "		98	14	$4\frac{1}{2}$

Case III.

When the price is shillings, or shillings and pence, and an even part of a pound.

Rule. Divide the given quantity by the even part, and the quotient is the answer in pounds. If there be a remainder, reduce it as in Compound Division.

Examples.

1. At 6*s.* 8*d.* per yard, what will 473 yards come to?

6*s.* 8*d.* | $\frac{1}{3}$ | 473

Ans. £157 13*s.* 4*d.*

	Yards.		s.	d.		£	s.	d.
2.	387	at	10		Ans.	193	10	0
3.	478	.	5	. . . . .		119	10	0
4.	397	.	3	4		66	3	4

Case IV.

When the price is shillings, or shillings and pence, which makes no even part of a pound.

Rule. Find the even parts for the price, and divide as in Case III. or multiply the given quantity by the shillings, and take the even parts of shillings for the pence, as in Case II.

Examples.

1. What cost 287 yards at 17*s.* 6*d.* per yard?

First method.

s.	*d.*		287		
10		½	143	10	
5		½	71	15	
2	6	½	35	17	6

Ans. £251 2*s.* 6*d.*

Second method.

287		
17	6	
2009		
287		
6 | ½ | 143	6	
2|0)502|2	6	

Ans. £251 2*s.* 6*d.*

	Yards.		*s.*	*d.*		£	*s.*	*d.*
2.	8172	at	15		Ans.	6129		
3.	3691	. . .	19		. . . . .	3506	9	
4.	4765	. . .	11	8	. . . . .	2779	11	8
5.	3718	. . .	18	4	. . . . .	3408	3	4
6.	709¼	. . .	12	6	. . . . .	443	5	7½
7.	213	. . .	14	10	. . . . .	157	19	6

Case V.

When the price is an even number of shillings.

Rule. Multiply the quantity by half the shillings, doubling the first (or right hand) figure of the product for shillings, the rest are pounds.

Examples.

1. What will 788 yards come to, at 2 shillings per yard?

788

1=half the shillings.

Ans. £78 16

	Yards.		*s.*		£	*s.*
2.	347	at	4	Ans.	69	8
3.	638	. . .	6	. . . . .	191	8
4.	589½	. . .	8	. . . . .	235	14
5.	246	. . .	10	. . . . .	123	0
6.	324¾	. . .	12	. . . . .	194	17
7.	523	. . .	14	. . . . .	366	2

When the quantity and price are both of several denominations.

RULE. Multiply the price by the number in the highest denomination, and take parts of the price for the rest, and these added together will give the answer.

EXAMPLES.

1. What will 6 cwt. 3 qrs. 14 lb. of sugar come to, at £3 15 6 per cwt.

		3	15	6	
				6	
		22	13	0	price of 6 cwt.
2 qrs.	½	1	17	9	" 2 qrs.
1 "	¼	0	18	10½	" 1 "
14 lb.	½	0	9	5¼	" 14 lb.
Ans.		£25	19	0¾	

2. What will 6 cwt. 2 qrs. 23 lb. of lead come to, at $12 per cwt.

		12,00	Or	751 lb.
		6		12
		72,00		4)9012
2 qrs.	½	6,00		
14 lb.	¼	1,50		7)2253
7 "	½	,75		
2 "	⅐	,21,4		4)321,857
Ans.		$80,46,4		$80,46,4

3. How much will 16 cwt. 1 qr. 25 lbs. of potashes come to, at $82,50 per ton, or 2240 lbs.

		82,50	Or	1845 lbs.
				82½
10 cwt.	½	41,25		3690
5 "	½	20,62,5		14760
1 "	⅕	4,12,5		922
1 qr.	¼	1,03,1		
14 lb.	½	0,51,5		4,0)15221,2
7 "	½	0,25,7		
4 "	⅐	0,14,7		7)3805,3
Ans.		$67,95,0		8)543,61
				$67,95

NOTE. The answer may be found by calculating it at $4,12½ cts. per cwt. equal to $82,50 per ton.

4. How much will 4 tons 15 cwt. 2 qrs. 22 lbs. of iron come to, at $212,50 per 2240 lbs.?

			Or 10718 lbs.
		212,50	$212\frac{1}{2}$
		4	
		850,00	21436
10 cwt.	$\frac{1}{2}$	106,25	10718
5 "	$\frac{1}{2}$	53,12,5	21436
2 "	$\frac{1}{16}$	5,31,2	5359
14 lb.	$\frac{1}{4}$	1,32,8	
8 "	$\frac{1}{7}$	0,75,9	4,0)227757,5
Ans.		$1016,77,4	7)56939,4
			8134,2
			1016,77,5

	T.	cwt.	qr.	lb.		£	s.	d.		£	s.	d.
5.		57	2	8	. .	3	17	9	. . .	223	16	2
6.		19	3	13	. .	2	5	10	. . .	45	10	6
7.	37	14	2	14	hemp	89	6	8	per ton.	3370	13	2
8.	27	16	3	18	. .	90	10		. . .	2520	0	5

	T.	cwt.	qr.	lb.		dols.	cts.		dols.	cts.
9.	24	18	3	18	hemp at	289	50	per ton. Ans.	7221	75
10.	31	16		. . .		268	75	. . . .	8546	25
11.	19	14	2	12	iron .	110		. . . .	2170	33 8
12.		17	3	24	cordage	14		per cwt. .	251	50

	A.	R.	per.		dols.		dols.	cts.
13.	25	2	25	of land at	29	per acre. Ans.	744	3
14.	87	1	37	. . .	33	. . . . .	2886	88

15. At £4 11 3 per cwt. what will 3 qrs. $25\frac{1}{2}$ lb. come to?

£4 11 3

2 qrs.	$\frac{1}{2}$	2	5	$7\frac{1}{2}$
1 qr.	$\frac{1}{2}$	1	2	$9\frac{3}{4}$
14 lb.	$\frac{1}{2}$	0	11	$4\frac{7}{8}$
7	$\frac{1}{4}$	0	5	$8\frac{7}{16}$
$3\frac{1}{2}$	$\frac{1}{2}$	0	2	$10\frac{7}{32}$
1	$\frac{1}{7}$	0	0	$9\frac{87}{112}$
Ans.		£4	9	$2\frac{23}{224}$.

16. What will 19 tons, 19 cwt. 3 qrs. $27\frac{1}{2}$ lb. come to, at £19 19*s*. $11\frac{3}{4}d$. per ton? Ans. £399 19*s*. $5\frac{14}{17}\frac{8}{9}\frac{4}{2}\frac{1}{0}$.

TARE AND TRET.

TARE and TRET are allowances made in selling goods by weight.

Tare is an allowance made to the buyer for the weight of the hogshead, barrel, or bag, containing the commodity.*

Gross weight is the whole weight of the goods, together with the hogshead, barrel, or bag, &c. that contains them.

Suttle is when part of the allowance is deducted from the gross.

Neat weight is what remains after all allowances are made.

EXAMPLES.

1. What is the net weight of 10 casks of allum, weighing gross, 33 cwt. 2 qrs. 15 lb. tare 15 lb. per cask?

	cwt.	*qr.*	*lb.*	
	33	2	15	gross
10×15=150=	1	1	10	tare
Ans.	32	1	5	net.

2. What is the tare of 138 cwt. 2 qrs. 8 lb. tare 4 lb. per cwt.

4=1/28=
4)138 2 8 gross
7)34 2 16
Ans. 4 3 22⅞ tare.

Or 138 at 1 lb.=1 0 26
4
4 3 20
2 qrs. 2
8 0⅞
4 3 22⅞

3. What is the net weight of 42 boxes of sugar, weighing gross 21588 lbs.—allowing 4 lb. per box for draft, and 15 per cent. for tare?

21588 gross
42×4= 168 draft
21420 suttle
15 per ct. 3213 tare
Ans. 18207 net lb.
equal to 162 cwt. 2 qrs. 7 lb.

*For Custom House allowances, see *American Duties.*

4. At 9 dollars 49 cts. per cwt. what will 3 hhds. of tobacco come to, weighing gross, viz.

	cwt.	*qr.*	*lb.*	*lb.*
No. 1.	9	3	25	tare 149
2.	10	2	12	150
3.	11	1	25	158

Ans. 265 dols. 46½ cents.

5. At 79*s.* 9*d.* per cwt. how much will 4 hhds. of madder come to, weighing gross, viz.

	cwt.	*qr.*	*lb.*	
No. 1.	10	3	4	
2.	11	2	13	
3.	10	1	16	
4.	14	3	19	tare 14 lb. per cwt.
14 lb. ¼	47	2	24	gross
	5	3	24	tare
	41	3	0	neat.

Ans. £166 9 6¾.

6. At 62*s.* per cwt. what will a hhd. of sugar come to, weighing gross 7 cwt. 1 qr.; tare 12 lb. per cwt.?

Ans. £20 1 4.

7. At 21 cents per lb. what will 6 hhds. of coffee come to, weighing gross, viz.

	cwt.	*qr.*	*lb.*	*lb.*
No. 1.	7	1	14	tare 96
2.	8	2	21	98
3.	7	1	21	91
4.	6	3	25	90
5.	7	0	23	89
6.	8	1	12	100

Ans. 964 dols. 32 cents.

8. 5 casks of potashes 1st sort. viz.

cwt.	*qr.*	*lb.*	*lb.*
3	2	0	tare 45
3	2	10	44
3	1	7	43
3	2	7	46
3	3	0	44

At $5,40 cts. per cwt. Ans. $84,95 cts.

9. 4 casks of potashes 2d sort, viz.

cwt.	qr.	lb.		lb.
3	3	0	tare	45
3	1	15		44
3	2	21		44
3	2	7		44

At $4,56\frac{1}{4}$ per cwt. Ans. $58,47 cts.

10. What is the gross weight of a hogshead of tobacco, weighing neat 11 cwt. 1 qr.; tare 14 lb. per cwt.?

Ans. 12 cwt. 3 qrs. 12 lb.

FELLOWSHIP

Is when two or more join their stocks, and trade together, dividing their gain or loss in proportion to each person's share in the joint stock.

SINGLE FELLOWSHIP.

Single fellowship is when different stocks are employed for a certain equal time.

Rule. As the whole stock is to the whole gain or loss, so is each man's particular stock to his particular share of the gain or loss.

Examples.

1. A and B buy certain merchandizes, amounting to £120; of which A pays £80 and B £40, and they gain by them £32—what part of it belongs to each?

A £80
B 40

As 120 : 32 : : $\begin{cases} 80 \\ 40 \end{cases}$ Ans. £21 6 8 A.
10 13 4 B.

2. A ship worth 8400 dollars being lost at sea, of which $\frac{1}{2}$ belonged to A; $\frac{1}{3}$ to B, and the remainder to C, what loss will each sustain, supposing they have 6000 dollars insured?

Ans. A's loss 600, B's 800, and C's 1000 dols.

3. A and B. have gained 1260 dollars, whereof A is to have 10 per cent. more than B, what is the share of each?

Ans. A's 660, B's 600 dols.

DOUBLE FELLOWSHIP.

Double Fellowship is when the stocks are employed for different times.

RULE. Multiply each man's stock by its time, and add them together, then say, As the sum of the products is to the whole gain or loss, so is the product of each man's stock and time to his share of the gain or loss.

EXAMPLES.

1. B and C trade in company, B put in £950 for 5 months, and C £785 for 6 months, and by trading they gain £275 18 4; what is each man's part of the profit?

B's stock $950 \times 5 = 4750$
C's $785 \times 6 = 4710$

As 9460 : 275 18 4 :: { 4750 : £138 10 10 B's
                      { 4710 : 137 7 6 C's

2. Two merchants enter into partnership for 16 months. A put into stock at first 1200 dols. and at the end of 9 months 200 dols. more; B put in at first 1500 dols and at the expiration of 6 months took out 500 dols.—with this stock they gained 772 dols. 20 cts. what is each man's part of it?

Ans. A's 401 dols. 70 cts.—B's 370 dols. 50 cts.

3. Two persons, A and B hired a coach in Boston, to go 40 miles, for 20 dols. with liberty to take in two more when they pleased. Now when they had gone 15 miles, they admit C, who wished to go the same route, and on their return, within 25 miles of Boston, they admit D for the remainder of the journey; supposing the coach to be at the expense of the parties, as they occupied it during the several stages, it is required to settle the hire between them.

Ans. A $6,77 1/12
B 6,77 1/12
C 4,89 7/12
D 1,56 3/12

$20,00

SIMPLE INTEREST

Is a compensation made by the borrower of any sum of money to the lender, according to a certain rate per cent. agreed on for the principal only.

The legal rate of interest in Massachusetts is 6 per cent.

Principal, is the money lent.

Rate, is the sum per cent. agreed on.

Amount, is the principal and interest added together.

GENERAL RULE. Multiply the principal by the rate per cent. and divide the product by 100, and the quotient is the answer for one year.

When the principal is dollars only, multiply by the rate, and from the product point off two figures to the right, the figures to the left hand of the point give the answer in dollars, and the rest are decimal parts or cents.

If there are cents, &c. in the principal, multiply by the rate and point off as above. The figures to the left of the point give the answer in the same name with the lowest denomination in the principal.

EXAMPLES.

1. What is the interest of $158 for one year at 6 per cent. per annum?

158
6

Ans. $9,48 cts.

2. How much is the interest of $256,48 cents for 3 years and 9 months, at 6 per cent. per annum?

256,48
6

1538,88 for one year.
3

4616,64 for 3 years.
6=½ 769,44 for 6 months.
3=¼ 384,72 for 3 months.

cts. 5770,80 Ans. $57,70 cents.

To find the interest of any sum for months at 6 per cent. per annum by contraction.

RULE. As half the months is equal to the rate for the time,—or, as the interest of any sum in dollars is one cent per dollar for every two months—multiplying the principal in dollars by the rate, or cents for the time, gives the answer.

EXAMPLES.

1. How much is the interest of $73 from the 6th June to 6th October?

73 the principal.
2 equal the rate.

1,46 Ans. $1,46 cents.

2. How much is the interest of $193 from 16 May, 1824, to 16 November, 1825, at 6 per cent. per annum? Equal to 18 months.

193
9 cents per dollar.

1737 cents. Ans. $17,37 cents.

When the time is months and days.—Take half of the months, and one sixth of the days, for the rate or multiplier.

EXAMPLES.

1. How much is the amount of $284,60 cents for 2 years, 4 months and 24 days, at 6 per cent. per annum?

284,60 for 28 months and 24 days.
14,4

113840
398440

Cents 4098,240

Interest $40,98
Principal 284,60

Ans. $325,58 the amount.

2. How much is the interest of $138 for 5 months and 18 days, at 6 per cent per annum?

	138	
	6	
	8,28 for 1 year.	
4 ms.	$\frac{1}{3}$=2,76	
1 "	$\frac{1}{12}$= 69	
15 days	$\frac{1}{2}$= 34,5	
3 "	$\frac{1}{5}$= 6,9	
	Ans. $3,86,4	

Or, by taking half of the months and one sixth of the days.

138	
2,8	
1104	
276	
$3,86,4 as before.	

The multiplier 2,8 is found by taking half of 4, the even months, and $\frac{1}{6}$ of 30+18, for the odd month, added to the days.

3. What is the interest of $959 for 294 days, at 6 per cent. per annum?

959	365		
294	100		
3836	6)36500	959	
8631		294	$ cts.
1918	6083)281946(46,35		by taking the
6,000)281,946		24332	year at 365 days.
Ans. $46,99		38626	
By taking the year at 360 days.		36498	
		21280	
		18249	
		30310	
		30415	

4. $479 for 6 months, at 6 per ct. per annum. Ans. $14,37
5. 219 . 5 . . . 5 4,56
6. 746 . 4 . . . $4\frac{1}{2}$ 11,19
7. 156 . 11 . . . $3\frac{3}{4}$ 5,36

8.	$796 for 3 yrs. 11 mo. at 6 per ct. per ann.	Ans.	$187,06
9.	286 . 1 . 1 9 ds. 5		15,85
10.	142 . 0 . 11 15 7		9,52
11.	86 . 1 . 0 25 . 9		8,27

12.	$876 for 57 days at 6 per ct. per ann.	Ans.	$8,32
13.	253 . 294 . . . 6		12,40
14.	196 . 258 . . . 6		8,43
15.	719 . 224 . . . 5		22,37
16.	384 . 318 . . . 5		16,96

To find the interest of English money at 5 per cent. per annum, the legal rate of interest in Great Britain.

RULE. As the rate is equal to one shilling per £ for a year, take the pounds of the principal for the interest in shillings. If there be shillings, &c. reduce them to pence, mentally, and take half of the sum (rejecting the unit figure) for the pence of the interest.

EXAMPLES.

1. What is the interest of £119 16 9 for one year, at 5 per cent.?

£119=£5 19 0
for 16*s.* 9*d.* by the rule 0 0 10

Ans. £5 19 10

2. How much is the interest of £619 for 96 days, at 5 per cent. per annum?

$$\frac{619\times 96=59424}{365}=162s.\ 9d.\ \text{Ans.}$$

		yr.	*days.*		
3.	£750 0 0 for	1	167	Ans.	£54 13 2
4.	12 17 8 "	1	122		0 16 5
5.	292 18 0 "		91		3 13 0
6.	452 14 5 "		10		0 12 4

The following method of calculating the interest upon accounts, when there are partial payments, is sometimes used.

1798.			Dols.		Days.	Prod. princ. & time.
Jan.	2,	Lent——100 on interest for		13	-	1300
	15,	Lent——110				
			210	- -	5 -	1050
	20,	Received 162				
			48	- -	14 -	672
Febr.	3,	Lent——95				
			143	- -	7 -	1001
	10,	Received 90				
			53	- -	6 -	318
	16,	Lent——186				
			239	- -	10 -	2390
	26,	Received 70				
			169	- -	-	507
March	1,	Lent——250				
			419	- -	2 -	838
	3,	Received 270				
			149	- -	10 -	1490
	13,	Received 143				
	20,	time of adjust. 6		- -	7 -	42
						9608

$ *cts.*

Then 6083)9608(1,57 interest at 6 per cent.
6083 6, * the principal due.

35250 7,57 the amount due March 20th.
30415

48350
42581

5769

In computing interest on notes when a settlement is made within a year from the date, or commencement of interest, it is generally the custom to find the amount of the principal from the time the interest commenced to the time of settlement, and likewise the amount of each payment, and then deduct the amount of the several payments from the amount of the principal.

Example.

A, by his note dated April 25th, 1798, promises to pay to B 774 dols. 76 cts. on demand, with interest to commence 4 months after the date. On this note are the following endorsements:

Received, *Oct.* 12th, 1798, 260 dols. 19 cts.—*Oct.* 13th, 1798, 60 dols.—*Nov.* 2, 1798, 200 dols. And the settlement is made *Dec.* 15th, 1798.

CALCULATION.

			Dols.	*cts.*
The principal carrying interest from 25th Aug. 1798			774	76
Interest to Dec. 15, 1798 -	3 m. 20 days		14	20
Amount of the principal - - -			788	96
		Dols.	*cts.*	
First payment, Oct. 12th, 1798 - -		260	19	
Interest to Dec. 15th, 1798	2 ms. 3 days	2	73	
Second payment, Oct. 13th, 1798 -		60	00	
Interest to Dec. 15th, 1798	2 ms. 2 days	0	62	
Third payment, Nov. 2d, 1798 - -		200	00	
Interest to Dec. 15th, 1798	1 m. 13 days	1	43	
Amount of payments - - - -			524	97
Settlement is made for - - - - -			$263	99

Dr. *B's Interest Account.*

To	Interest of	$715,00	for 230	days		$27,03,4
To	"	496,75	" 185	"		15.11,5
To	"	874,19	" 106	"		15.22.9
					Amount	$57,37,8

Cr.

By	Interest of	$913,27	for 179	days . . .	$26,86,6	
By	"	361,83	" 82	" . . .	4,87,9	
By	"	512,14	" 43	" . . .	3,61,9	
						35,36,4
				Balance of Interest		$22,01,4

Calculation of the same by balance of products of money and time.

Dr.

To	Interest of	$715,00	for 230	days . . .	products	164450
To	"	496,75	" 185	"	"	91945
To	"	874,19	" 106	"	"	92644
					Product of Dr.	349039

Cr.

By	Interest of	$913,27	for 179	days	163427	
By	"	361,83	" 82	"	29684	
By	"	512,14	" 43	"	22016	
					Products of Cr.	215127
					Balance of products	133912

$ *cts. m.*

6083)133912(22,01, 4 as before.
12166

12252
12166

86,000
6083

25170
24332

In casting interest, it is customary to neglect the cents, if under 50, and if 50 or more, to add one to the dollars.

RULE established by the Courts of Law in Massachusetts, for making up judgments on SECURITIES FOR MONEY *which are upon Interest, and on which partial payments have been endorsed.*

COMPUTE the interest on the principal sum, from the time when the interest commenced to the first time when a payment was made, which exceeds either alone or in conjunction with the preceding payments (if any) the interest at that time due: add the interest to that principal, and from the sum subtract the payment made at the time, together with the preceding payments (if any) and the remainder forms a new principal; on which compute and subtract the interest, as upon the first principal: and proceed in this manner to the time of the judgment. By this Rule, the payments are first applied to keep down the interest; and no part of the interest ever forms a part of a principal carrying interest.

The following example will illustrate the rule, in which the interest is computed at the rate of 6 per cent. by the year, that being the legal rate of interest in Massachusetts.

A, by his note, dated January 1, 1780, promises to pay B 1000 dollars in six months from the date, with interest from the date.

On this note are the following endorsements:

Received *April* 1, 1780, 24 dols.—*Aug.* 1, 1780, 4 dols.—*Dec.* 1, 1780, 6 dols.—*Feb.* 1, 1781, 60 dols.—*July* 1, 1781, 40 dols —*June* 1, 1784, 300 dols.—*Sept.* 1, 1784, 12 dols.—*Jan.* 1, 1785, 15 dols. and *Oct.* 1, 1785, 50 dols.—and the judgment is to be entered *Dec.* 1, 1790.

CALCULATION.

The principal sum carrying interest from January 1, 1780		$1000 00
Interest to April 1, 1780, 3 months - - - - -		15 00
	Amount	1015 00
Paid April 1, 1780, a sum exceeding the interest		24 00
Remainder for a new principal - - - - - -		991 00
Interest on $991 from April 1, 1780, to Feb. 1, 1781, (10 m.)		49 55
	Amount	1040 55
Paid Aug. 1, 1780, a sum less than the int. then due	$4 00	
Paid Dec. 1, 1780, do. do.	6 00	
Paid Feb. 1, 1781, do. greater than the int. then due	60 00	
		70 00
		970 55

Remainder for a new principal - - - - - -	$970 55
Interest on 970 dols. 55 cts. from Feb. 1, 1781, to July 1, 1781, (5 months) - - - - - - -	24 26
Amount	994 81
Paid July 1, 1781, a sum exceeding the interest -	40 00
Remainder for a new principal - - - - - -	954 81
Interest on 954 dols. 81 cts. from July 1, 1781, to June 1, 1784, (2 years 11 months) - - - - - -	167 09
Amount	1121 90
Paid June 1, 1784, a sum exceeding the interest -	300 00
Remainder for a new principal - - - - - -	821 90
Interest on 821 dols. 90 cts. from June 1, 1784, to Oct. 1, 1785, (1 year 4 months) - - - - - -	65 75
Amount	887 65
Paid Sept. 1, 1784, a sum less than the int. then due, $12 00	
Paid Jan, 1, 785, do do. - 15 00	
Paid Oct. 1, 1785, do. greater with two last payments than the interest then due - - - 50 00	
	77 00
Remainder for a new principal - - - - - -	810 65
Interest on 810 dols. 65 cts. from Oct. 1, 1785, to Dec. 1, 1790, the time when judgment is to be entered (5 years 2 months) - - - - - -	251 30
Judgment rendered for the amount - - - - -	1061 95

The following statement of the same Note shews the interest and principal more distinctly separate.

1	principal	commencing Jan. 1, 1780,	$1000,00
1	payment $24, less $15, for int. due	" April 1, "	9,00
2	principal	commencing " 1, "	991,00
2	payment 4 less than the int. due	" Aug. 1, "	
3	ditto. 6 "	" " " Dec. 1, "	
4	ditto. 60 - - - - - - - - -	Feb. 1, 1781,	
	70 less $49,55, for interest then due		20,45
3	principal	commencing Feb. 1, "	970,55
5	payment 40 less $24,26, for int. due	" July 1, "	15,74
4	principal	commencing " 1, "	954,81
6	payment 300 less $167,09, for int. due	" June 1, 1784,	132,91
5	principal	commencing " 1, "	821,90
7	payment 12 less than the int. due	" Sept. 1, "	
8	ditto. 15 "	" " " Jan. 1, 1785,	
9	ditto. 50 "	" " " Oct. 1, "	
	77 less $65,75, for int. then due.		11,25
6	principal	commencing Oct. 1, "	810,65
10	payment 1061,95, less $251,30 for int. due	Dec. 1, 1790,	810,65

RECAPITULATION.

				payments		thus applied.		
1780	April	1	Received	$24 00	interest	$15,00	principal	$ 9,00
	Aug.	1	"	$4				
	Dec.	1	"	6				
1781	Feb.	1	"	60				
				— 70,00	"	49,55	"	20,45
	July	1	"	40,00	"	24,26	"	15,74
1784	June	1	"	300,00	"	167,09	"	132,91
	Sept.	1	"	12				
1785	Jan	1	"	15				
	Oct.	1	"	50				
				-- 77,00	"	65,75	"	11,25
1790	Dec.	1	"	1061.95	"	251,30	"	810,65
	Amount received			$1572,95		$572,95	principal	$1000,00
							interest	572,95
								$1572 95

The following example shews how the Massachusetts and Connecticut Court-Rules for calculating interest differ.

B borrows of C, $1500, on his note at 6 per cent. per annum. At the expiration of 6 months he pays $1000, which is endorsed on his note, and in 6 months after, he pays it in full. Required the amount due at the expiration of the year.

In Massachusetts.

principal - - - -	$1500
6 months' interest . -	45
	1545
payment - - - -	1000
	545
Interest of $545 for 6 months	16,35
Amount due	$561,35

In Connecticut.

principal - - - - -		$1500
one year's interest - -		90
		1590
payment	$1000	
Interest of 1000 for 6 m.	30	
		—1030
* Amount due		$560

*The payment of $1000 being "made before one year's interest had accrued, and being *more* than the interest arisen at the time of such payment, the interest is computed on it from the time it was paid, up to the end of the year, and added to the payment, the sum is deducted from the principal and interest added as above."—*Kirby's Reports, page* 49.

COMPOUND INTEREST

Is that which arises both from the *principal* and *interest;* that is, when the interest on money becomes due, and not paid, it is added to the principal, and interest is calculated on this amount as on the principal before.

Rule. Find the simple interest of the given sum for one year, and add it to the principal, and then find the interest for that amount for the next year, and so on for the number of years required. Subtract the principal from the last *amount*, and the remainder will be the compound interest.

Examples.

1. Required the amount and interest of $629 for 7 years, at 6 per cent. per annum, compound interest?

		629,00	principal for 1st year.	
$629,00	×6÷100	37,74	interest	1st ”
		666,74	principal	2d ”
666,74	” ”	40,00,4	interest	2d ”
		706,74,4	principal	3d ”
706,74,4	” ”	42,40,4	interest	3d ”
		749,14,8	principal	4th ”
749,14,8	” ”	44,94,9	interest	4th ”
		794,09,7	principal	5th ”
794,09,7	” ”	47,64,6	interest	5th ”
		841,74,3	principal	6th ”
841,74,3	” ”	50,50,5	interest	6th ”
		892,24,8	principal	7th ”
892,24,8	” ”	53,53,5	interest	7th ”
	Ans.	$945,78,3	amount	
		629,00,0	principal	
		$316,78,3	interest.	

A TABLE shewing the amount of one pound or one dollar for any number of years under 33, at the rates of 5 and 6 per cent. per ann. compound interest.

Years.	5 *Rates.* 6		*Years.*	5 *Rates.* 6	
1	1,05000	1,06000	17	2,29201	2,69277
2	1,10250	1,12360	18	2,40662	2,85434
3	1,15762	1,19101	19	2,52695	3,02559
4	1,21550	1,26247	20	2,65329	3,20713
5	1,27628	1,33822	21	2,78596	3,39956
6	1,34009	1,41852	22	2,92526	3,60353
7	1,40710	1,50363	23	3,07152	3,81975
8	1,47745	1,59384	24	3,22510	4,04893
9	1,55132	1,68948	25	3,38635	4,29187
10	1,62889	1,79084	26	3,55567	4,54938
11	1,71034	1,89829	27	3,73345	4,82234
12	1,79585	2,01219	28	3,92013	5,11168
13	1,88565	2,13292	29	4,11613	5,41838
14	1,97993	2,26090	30	4,32194	5,74349
15	2,07892	2,39655	31	4,53804	6,08810
16	2,18287	2,54035	32	4,76494	6,45388

The use of this Table is plain and easy, for multiplying the figures standing against the number of years, by the given principal, the product is the amount required.

EXAMPLES.

1. What is the amount of $629 for 7 years at 6 per cent. per annum, compound interest?

1,50363 the tabular number for 7 years.
629

1353267
300726
902178

945,78327 Ans. $945,78.

2. How much will £2 8*s*. amount to in 28 years at 6 per cent. per annum, compound interest? Ans. £12 5 4¼.

COMMISSION AND BROKERAGE.

COMMISSION and BROKERAGE are compensations to Factors and Brokers for their respective services.

The method of operation is the same as in Simple Interes

EXAMPLES.

1. What is the commission on 1974 dollars at 5 per cent.?

1974
5

98,70 Ans. 98 dols. 70 cts.

2. The sales of certain goods amount to 1873 dols. 40 cts. what sum is to be received for them, allowing $2\frac{1}{2}$ per cent. for commission, and $\frac{1}{4}$ per cent. for prompt payment of the neat proceeds? Ans. 1821 dols. 99 cts. 9 m.

To invest or purchase, so as to reserve the commission, or not to overship net proceeds.

As 100 more the commission on the intended purchase is to 100, so is the proposed sum to that to be laid out or invested.

EXAMPLES.

1. A factor has in his hands $709,80, and being directed to invest it in purchasing certain goods, How much can he invest so as to reserve his commission of 5 per cent. on the purchase?

100
5

105 : 100 : : 709,80
100

105)70980.00(676
630

798
735

630
630 Ans. $676.

2. As the commission in this case is an even part of 100 say $\frac{1}{21}$, deducting $\frac{1}{21}$ part of the given sum will give the amount to be laid out or invested—thus

$\frac{1}{21}$ { 21)709,80 Net proceeds
7)236,60

33,80 Commission

Ans. $676,00 to be invested.

If at $2\frac{1}{2}$ per cent. or $\frac{1}{40}$ part, deducting $\frac{1}{41}$ would give the answer.

3. A factor has in his hands 3690 dollars, which he is directed to lay out in iron, reserving from it his commission of $2\frac{1}{2}$ per cent. on the purchase; the iron being 95 dols. per ton, how much did he purchase?

Ans. 37 tons 17 cwt. 3 qrs.. $16\frac{4}{19}$ lbs.

INSURANCE.

INSURANCE is a contract by which the Insurer undertakes, in consideration of a stipulated premium, to indemnify the person insured from loss, or damage to the property at risk, by certain perils enumerated in the contract.

The instrument, which is the evidence of this contract, is called a *Policy of Insurance.*

The premium is the sum paid by the person insured to him who insures, for taking the risk.

The insured [or assured] is the person who owns the property at hazard, which is the subject of the contract.

Some policies contain a stipulation that the Insurer shall not be liable for *partial* losses under *five* per cent.;—others *ten* per cent.—but for *general averages* the Insurer is liable, be they ever so small.

A *General Average* signifies a contribution made by the Owners of the Ship, Cargo and Freight, paid by each in proportion to the amount saved of each, toward any particular loss or expense voluntarily incurred, as by the cutting away of a mast or cable, hiring extra men, when in distress, &c. for the general safety of the Ship and all on board, in order that he whose goods may have been thus sacrificed, or he whose money may have been thus expended, may lose no more, and that all others interested in Ship, Cargo or Freight may lose no less than their proportional part.

A *Partial Loss*, is a loss by the perils against which the Insurer has undertaken to indemnify, in the ordinary prosecution of the Voyage, and not voluntarily incurred;—as if a vessel's masts be swept away by the force and violence of the winds—or goods be damaged by the straining of the ship, so as to cause her to leak.

Total Losses are of two kinds—*absolute*, and *legal* or *technical.*

An *absolute* total loss is when the Ship or Property insured is entirely destroyed, as if they be sunk, or consumed by fire.

A *legal* or *technical* total loss is when the loss is of that nature and extent, which authorises the Assured to abandon the property insured to the Insurer.—As if a vessel be so much damaged by perils, insured against, as to require repairs exceeding the one half her value, after deducting one third from the cost of repairs, for the difference between new and old, according to an established rule;—or if goods be damaged to more than half their value. In such cases, if the Assured abandon, it is a total loss with Salvage. If he does not abandon, it is settled as a partial loss.—The Assured is never obliged to abandon; but under these circumstances he has the option to abandon the property insured to the Insurer, who is thereupon obliged to pay the sum insured upon it, and take what may be saved. Or he (the Assured) may keep what is saved, and claim and recover, as for a *partial* loss, as he may deem most for his interest.

Losses are generally made payable in sixty days after proof is presented, but the parties may vary this term by special agreement.

Policies usually contain a stipulation, that in case of loss the Insurer shall be allowed to deduct one per cent.

A person may insure the whole or any part of his property. If he insures a part only, he is considered as being himself the Insurer of the residue.—To insure the whole, he must not only insure the cost and charges, or value of the property, at the port of Shipment, but he must cover his premium and the one per cent. abatement, together with the commission paid for making the Insurance and for collecting the loss if any be paid.—To ascertain what sum must be insured to cover the premium and charges, he must first ascertain what sum will be covered by insuring one hundred dollars, and so many times as this sum is contained in the sum to be covered so many hundred dollars he must insure—thus,

Suppose A ships an adventure, the cost of which is	$1000
The shipping charges and packages - - -	50
	1050

He wishes to cover this sum at a premium of 5 per cent. by which is to be understood, that he wishes to insure that amount which will authorize him to receive of the Insurers $1050 in case of a total loss.

The sum to be covered is - - -	$1050
Add the cost of the policy - - -	1
	$1051

The premium is *five* per cent.—Commission for making the insurance *half* per cent. and for collecting the loss, *one* per cent.

For the Insurance of $100, he will receive in case of total loss - - - - - - - - - $100,00

Subject to deduction, viz.

For Premium - - - - -	$5,00	
Abatement - - - - -	1,00	
Commission for making Insurance -	0,50	
" " recovering Loss -	1,00	
		7,50
		92,50

The insurance of $100 therefore leaves $92,50 only, and as many times as $92,50 are contained in $1051, so many times $100 he must insure.

92,50 : 1051 : : 100 : $1136,21 to be insured.

PROOF.

Sum insured - - - - - -		$1136,21
Deduct viz.		
5 per cent. premium - - -	$56,81	
Policy - - - - - -	1,00	
1 per cent. abatement - - -	11,36	
½ per cent. Commission - -	5,68	
1 per cent. for collecting - -	11,36	
		86,21
The sum to be covered -		$1050,00

DIRECTIONS TO SHIP-MASTERS.

IN case of shipwreck—or the vessel's putting into a port in distress, or arriving at her port of destination in a damaged state, the port being other than that to which she belongs, *the master* is the *agent* of all concerned. It is his duty

while acting in such capacity, to do all that is requisite for the protection of the property, without unnecessary delay, performing such duties in behalf and for the benefit of all concerned. He must be actuated in all his proceedings by a strict regard to impartiality, and if possible, without "reference to the particular and conflicting interests of different parties." If the property be exposed to danger, his primary efforts must be to protect it from such exposure, in the most speedy and effectual mode, and at the least possible expense. In case of shipwreck, he should make the most economical arrangement that the nature of the case will admit, to save as much property as can be saved, and to forward it to the consignees by other vessels, when the ship cannot be repaired, provided it can be done without any unreasonable expense; but if the expense of forwarding the goods to their destination would be very great, so as to exceed their value, or so great a proportion of the value, as to render it manifestly for the interest of the proprietors to sell them, they should be sold. This, however, is an exercise of authority which requires the utmost circumspection, and when there exists any reasonable doubt of the expediency and necessity of a sale, the goods should be forwarded. In all cases of doubt, it is advisable that the master should consult with discreet and honest men, as opportunity may present, before he decides on the course to be pursued; and having obtained the best information and advice, it rests with him to decide upon the course to be pursued, in the exercise of a sound discretion, and in behalf of all parties interested. It is however to be always kept in mind that he is not bound to follow the counsel of any person whose advice he may ask, unless it be a person having some authority over the property.

When circumstances will admit and no injury is likely to result from delay, the owner or consignee should undoubtedly be consulted, before any important measures are taken, further than to provide for the present security of the property; and in all cases the agent should communicate to the owners, consignees and others likely to be interested, the situation of the vessel or property, as fully as he is able, with the least possible delay. When the port of necessity happens to be a foreign one, or the stranding happens on a foreign shore, the master will be governed by the laws and customs of such place. In all cases where damage to the vessel or cargo are known or even apprehended, it is neces-

sary that surveyors should be legally called upon to examine the state and condition of the same, this duty is generally performed by Port Wardens, when only the cargo is to be surveyed, but when the inquiry or examination is to extend to the vessel, it is requisite that one or more ship carpenters should compose a part of the survey. If a vessel or her cargo has suffered more or less damage, it would not be safe for the master or agent to proceed to repair the damage or effect a sale in whole or in part, without such previous consultation. Surveyors have no authority to instruct or direct the master to sell a stranded vessel or goods that are damaged. No man can be compelled to sell his property against his own inclination, nor has any Legislature or Government a right to give Port Wardens or Surveyors power to dispossess a man of his property, nor to control him in the disposal of it, merely because he has been so unfortunate as to suffer shipwreck, except so far as may be necessary for the prevention of fraud upon the Revenue, or where articles in a perishing state are likely to endanger the health of a community. In this latter case the right of self-preservation will give the local authorities of the place the power to interfere to avert such a calamity, by causing a proper disposition of the damaged articles. In every other case, the owner or the master, his agent or representative being lawfully in possession of the property, have the whole power and control over the vessel and cargo, as perfectly after the shipwreck as before, and it is only when they request Port Wardens or Surveyors to interfere that the latter have any right so to do.

There are cases where a master ought to disregard the opinions of a survey, notwithstanding the responsibility, as if they should pronounce sentence of condemnation on a vessel that ought to be repaired, that they or their friends might become the purchasers, in a place where there would be little, if any, competition, or where they should order a vessel to be repaired, which clearly ought to be condemned, being influenced thereto by similar motives, and generally in all cases where the surveyors, acting under the influence of corrupt intention, advise to what is clearly contrary to the true interests of the owners of vessel and cargo.

Cables carried on the deck of a vessel are at the risk of the owner.* "The ship's furniture cut and thrown over-

* In *particular cases* it is otherwise.

board, *must have been kept at their proper places* to entitle the owner to restitution."

The master of a vessel cannot become a purchaser at a sale of the property which is sold by his authority, as agent of the owners.

Ship masters seem to have imbibed an opinion, that the free use of the knife or the axe is necessary to charge the underwriters with the loss, for which they would otherwise not be liable. It often occurs, as appears by the protests, that sails, having been split, are cut from the yards, and the reason alleged is that they could not get them in. This may sometimes be the case, but even then the act of cutting them away does not change what was *wear and tear*, to either a partial, or General Average loss. And it very often happens, that masts or topmasts are broken and hanging over the side, attached to the rigging, by which the hull of the vessel is greatly exposed to injury, the mere use of the axe or the knife cannot change *this* which is a partial loss, to a General Average, for the loss has already accrued, and the situation in which these articles are placed by the breaking of the masts, renders them of no value whatever. It is the duty of the master to make every effort, consistent with the safety of the vessel and crew, to save as much of the wreck as he can, and although the preservation of the vessel in a storm may require that such dangerous appertenances should be got rid of speedily, it may happen that the weather may be so favourable, that they may be in part preserved, and such successful exertions will merit the approbation of insurers, and entitle the master to their favourable consideration. It is the duty of the master at all times to act in reference to the interests committed to his charge, with perfect integrity and impartiality. He should not inquire whether the property is, or is not insured. *There is but one course* for *him to pursue, and that is an honest one*, a regard to his own interest it is supposed will lead him to ascertain its lawfulness. The master should on entering a port whether he *knows* or *apprehends* that his vessel or her cargo has sustained injury, note a protest before the proper authorities of such port or place, and as it has been before noticed, should apply for a survey before opening the hatches, for if goods are landed and stored, and subsequently ascertained to be damaged, it may be difficult to trace such damage to the voyage of importation, and it is questionable at least, whether the under-

writers would be held to pay for such damage, the legal and customary measures on arrival, and before discharging, having been omitted.

AVERAGE.

In computing a general average for masts, rigging, &c. cut away, a deduction is made of one third, from the cost of replacing them, as the new articles are supposed to be so much better than the old; but goods thrown overboard are valued at the sum they would have brought, had they arrived. But it is necessary to remark that before proportioning the loss, *each* of the *interests*, viz. the *cargo*, the *ship*, and the *freight*, after the value is ascertained, must be cleared of all charge attached to it.

General Rule. As the whole value, subject to *contribution*, is to the whole loss, so is each person's share of that value, to his proportional average of the loss, or so is $100, or £100, to the average loss *per cent.*

1. What should the following be valued at, in calculating an average, viz.

30 tons old sable iron . . .	cost .	$105,00	per ton.
60 pieces sail cloth	" . .	23,00	per piece.
109 " ravens' duck . . .	" . .	12,25	" "
10 " sheeting	" . .	17,25	" "
Freight of the iron . .	$270,00	Duty	305,02
ditto sail cloth, &c. . . .	59,96	"	417,30

Thus calculated.

Cost of the iron		$3150,00	
Freight	270,00		
Duty	305,02		
		575,02	
			$2574,98
Cost of sail cloth . . .	$1380,00		
" ravens' duck . .	1335,25		
" sheeting . . .	172,50		
		2887,75	
Freight of sail cloth, duck and sheeting . .	59,96		
Duty	417,30		
		477,26	
			2410,49
		Ans. Net value	$4985,47

2. A ship in her passage from Amsterdam to ——, having received much damage in a gale, bore away for Ireland, where she arrived on the 5th October; and having received the necessary repairs, was ready for sea on the 23d December. Allowing $377 per month for the wages of the captain and crew, and 33⅓ cents each per day for 14 men, What did the whole amount to, in calculating the average.

		dls.			
Oct. 26	If 30	: 377	: : 79 :	$992,76	for wages.
Nov. 30	1	: 4,66⅔	: : 79 :	368,67	" board.
Dec. 23					
—				Ans. $1361,43	
79 days.					

3. In consequence of damage at sea, and expenses thereby incurred, the ship Massachusetts, freight and cargo delivered, amounting in the whole to $75240, have to make good $7561,62. What is the average loss per cent.?

If 75240 : 7561,62 : : 100 Or, 75240 : 7561,62 : : 1 dol.
100 1

7524,0)7561620,0(1005 75240)756162(10,05 cts.
7524 75240

37620 3762,00
37620 3762,00

Ans. 10,05 per cent. or, 10,05 cts. per dollar.

4. It is required to know how much is to be charged to each of the following, interested in the preceding statement, viz.

Ship valued at	$6586,00	at $10,05 per cent.	$661,89
Freight	4420,14		444,22
A's goods	39341,28		3953,80
B's "	21790,41		2189,94
C's "	1443,72		145,09
D's "	388,14		39,01
E's "	101,59		10,21
F's "	1168,72		117,46
	$75240,00		$7561,62

FREIGHT.

FREIGHT, in navigation and commerce is the consideration of money agreed to be paid for the use or hire of a ship, or, in a larger sense, the burthen of such ship.

1. What is the freight of 1776 cwt. 2 qrs. 24 lbs. of sugar to Amsterdam at £5 sterling per ton, equal to 5s. per cwt.

	1776 2 24
	5
	8880
2 qrs.	2 6
16 lb.	0 9
8 lb.	0 4
2,0)888,3	7
	£444 3 7 Equal to $1974,13 cts.

2. What is the freight of 393 cwt. 2 qrs. 24 lbs. of coffee at 90s. per 2000 lbs.?

	39300
	4716
	56
	24
	44096
	90
2,000)3968,640	
20)1984,320	
	£99 4 3

3. What will the freight of 6 tons 4 cwt. 2 qrs. 18 lbs. of sugar, delivered at Trieste amount to at £4 ster. per ton?
Ans. £24 18 7½.

4. What is the freight of 12 boxes measuring 249 feet 4 inches at 2s. per foot? Ans. £24 18 8.

The readiest way for casting freight is to have a table previously made, thus—at the preceding rate of £4.

1 Ton	-	-	is	-	-	-	£4	0	0
1 Cwt.	-	-	"	-	-	-	0	4	0
1 Quarter	-	-	"	-	-	-	0	1	0
21 lb.	-	-	"	-	-	-	0	0	9
14 lb.	-	-	"	-	-	-	0	0	6
7 lb.	-	-	"	-	-	-	0	0	3
5 lb.	-	-	"	-	-	-	0	0	2
2 lb.	-	-	"	-	-	-	0	0	1

Use of the Table.

1. Required the freight of *T. C. qr. lb.* 15 4 2 3 at £4 ster. per ton.

15 tons at £4		-	is	-	-	-	£60	0	0
4 cwt.	4s.	-	"	-	-	-	0	16	0
2 qrs.	1s.	-	"	-	-	-	0	2	0
3 lbs.		-	"	-	-	-	0	0	1½

Ans. £60 18 1½
Or, $270,70 by the table.

2. Required the freight of the following goods in the Camillus, delivered in Trieste, at £4 ster. per ton.

	T.	*C.*	*qrs.*	*lbs.*
A's goods	31	19	0	15
B's "	21	19	3	22
C's "	66	6	3	14

Ans. A's £127 16 7 or, $568,13
B's 87 19 9½ 391,07
C's 265 7 6 1179,44

3. G's freight in the Camillus, making part of the return cargo from Trieste to Boston, viz.

16 boxes soap - - -	8742 lbs.	Trieste.
20 pigs lead - - - -	4080 "	"
12 kegs quicksilver - -	1800 "	"
	14622 "	"

What would it amount to in Boston, at £4 sterling for 2000 lbs.—100 lbs. Trieste or Vienna weight being equal to 123 lbs. English?

	14622,
At 20	2924,4
2	292,4
1	146,2
	17985,
	2 £ per 1000 lbs.
	35,970
	20
	19,400
	12
	4,800

Ans. £35 19 5 $159,87.

An estimate of the quantity of certain goods calculated to make a ton in freight, viz.

60	Bolts of	Sail Cloth.
70	Half pieces	Duck.
80	Pieces	Sheeting.
90	"	Ravens' Duck.
120	"	Drillings.
1	Hhd.	Tobacco.
252	Gallons	Liquors.
236	"	Oil.
800	lbs.	Cotton.
2000	"	Coffee.
12	Cwt.	Indigo.
16	"	Pepper.
20	"	Rice.
20	"	Sugar.
20	"	Salt Petre.
16	"	Turmeric.
16	"	Ginger.

40 cubic feet in Merchants' ships.

When freight is per barrel, five cubic feet of other goods are allowed for a barrel.

It would be well, if in making contracts for freight in foreign ports, captains or supercargoes would ascertain the contents of merchandize by actual measurement. This is the more necessary, as the customary rate of the tonnage of some goods differs from the true contents.

PRIMAGE.

PRIMAGE is a certain allowance paid by the shipper or consignee of goods, to the master of a vessel for loading the same.

What is the primage on the following sums at 5 per cent. viz.

A's freight of £814 11 8 sterling.
B's " 321 5 3 "
C's " 675 2 3 "

Ans. On A's freight £40 14 7 or $181,02
B's " 16 1 3 71,38½
C's " 33 15 1 150,01

BUYING AND SELLING STOCKS.

STOCK, in the sense in which it is here used, is a fund established by government or individuals in a corporate capacity, the value of which is variable.

EXAMPLES.

1. What is the amount of 1565 dollars national bank stock, at 134 per cent.?

1565
134
6260
4695
1565
2097,10 Ans. 2097 dols. 10 cts.

2. What is the amount of 2958 dols. bank stock, at 25 per cent. advance?

2958
25 ¼ 739,50
3697,50 Ans. 3697 dols. 50 cts.

DISCOUNT

Is the abating of so much money to be received before it is due, as that money, if put at interest, would gain in the same time and at the same rate.

Thus 100 dollars would discharge a debt of 106 dollars payable in 12 months, discount at 6 per cent. per annum, because the 100 dollars received would, if put to interest regain the 6 dollars discount.

RULE. As 100 dollars, with the interest for the given time, is to 100, so is the given sum to the present worth, and the difference between the present worth and the given sum is the discount.

EXAMPLES.

1. What is the present worth of 450 dols. due in 6 months, discount at 6 per cent. per annum?

6 *m.* $\frac{1}{2}$ 6

3

100

d.

103 : 100 : : 450

Ans. 436 dols. 89 cts.

2. How much is the discount of £308 15*s.* due in 18 months, at 8 per cent. per annum? Ans. £33 1 7$\frac{1}{4}$.

3. What is the present worth of 5150 dols. due in 4$\frac{1}{2}$ months, discounting at the rate of 8 per cent. per annum, and allowing one per cent. for prompt payment?

Ans. 4950 dols.

4. A is to pay 5927 dols. on the 19th of April, 1799, and 5989 dols. the 19th of July following—It is required to know how much money will discharge both sums on the 19th of January, 1799, discounting at 8 per cent. per annum?

Ans. 11569 dols. 43 cts.

Though the discount found by the preceding method is thought to be the sum that should be deducted for present payment in justice to both parties, yet in business the interest for the time is taken for the discount.

EXAMPLES.

5. What ready money will discharge a note of 150 dollars, due in 60 days, allowing legal interest, or 6 per cent. per annum as discount?

150
1=half the months.

1,50
150 the debt.
1,50 the interest.

148,50 Ans. 148 dols. 50 cts.

6. Bought goods to the amount of 950 dollars, at 90 days credit, what ready money will discharge it, allowing the interest for the time at 6 per cent. per annum as discount?

Ans. 935 dols. 75 cts. if calculated for 3 months.
935 dols. 95 cts. if calculated for 90 days.

When the interest for the time is allowed as discount, it is presumed that neither party suffers any loss, but the following statement evinces the contrary.

A owes B 100 dollars payable in 12 months, for present payment of which B allows 6 dollars or the interest for the time, and receives 94 dollars; this sum he immediately lends to C for the same space of time, and then receives the amount, being 99 dollars 64 cents, which is 36 cents less than he would have to receive from A, had he left the money in his hands—but if he had allowed A the discount, and not the interest, for the time, he would have received from him 94 dols. 34 cents, and this sum being put to interest, would amount to 100 dols. in one year, which shews that the discount and not the interest, is the just deducdion for prompt payment.

But when discount is to be made for present payment, without any regard to time, the interest of the sum, as calculated for a year, is the discount.

EXAMPLES.

7. How much is the discount of 853 dols. at 2 per cent.?

853
2

$17,06 Ans. 17 dols. 6 cts.

8. How much money is to be received for 985 dols. 75 cts. discounting 4 per cent.? Ans. 946 dols. 32 cents.

9.	$6,50	discounting	10 per ct. is . .	$5,85
10.	2,50	"	16	2,10
11.	4,50	"	16⅔	3,75
12.	15,80	"	15	13,43
13.	11,20	"	12½	9,80
14.	43,60	"	35	28,34
15.	196,50	"	22	153,27
16.	594,20	"	25	445,65
17.	895,62	"	33⅓	597,08

Required the Interest and Discount of the following sums at 6 per cent. per annum.

				for interest.	*for discount.*
18.	$896,50	payable in	10 months—Ans.	$44,82½	$42,69
19.	875,00		7	30,62½	29,59
20.	796,00		8	31,84	30,61½
21.	980,75		9	44,13	42,23

To raise the price of goods, so as to discount without loss.

RULE. As 100, less the discount is to 100, so is the present price, to the price required—Or as 100, less the discount, is to the discount, so is the present price or value, to the sum to be added.

EXAMPLES.

1. The present worth of certain goods is $930, at what must they be valued to allow 7 per cent. discount without loss?

100 Or 93 : 7 : : 930
7 7

93 : 100 : : 930 93)6510
100 $70 to be added.
93)93000
1000 Ans. $1000.

2. A parcel of goods is charged at £54 14 7, how must it be valued to allow 10 per cent. without loss?

Ans. £60 16 2⅔.

BANK DISCOUNT.

1. What is the Bank Discount of $563,74 for 30 days with grace?

563,74
$\frac{1}{6}$ of 33= ,5½

281870
28187

cts. 310,057 Ans. $3,10 cts.

2. What is the discount of $686,74 for 63 days?

686,74
$\frac{1}{6}$ of 63= 1,0½

686740
34337

cts. 721,077 Ans. $7,21

3. Required the discount of $567 for 129 days.

567
129

5103
6804

6)73,143

Ans. $12,19 cts.

4. What is the discount of $385 for 119 days?

385
119

3465
4235

6)45,815

7,636 Ans. $7,64 cts.

*EQUATION OF PAYMENTS.**

The design of this Rule is to find a mean time for the payment of several sums due at different times.

Rule. Multiply each sum by its time, and divide the sum of the products by the whole debt; the quotient is accounted the mean time.

Examples.

1. A owes B 200 dollars, whereof 40 dollars is to be paid in 3 months, 60 dollars in 5 months, and the remainder in 10 months, at what time may the whole be paid without any injustice to either?

dols.		*mo.*	
40	×	3	= 120
60	×	5	= 300
100	×	10	=1000
200		200	)1420

7 months and 3 days.

* Equal payments being at 3 and 6 months, the mean is 4½ months—at 3, 4 and 6 months, the mean is 4⅓ months, &c.

2. A is indebted to B £120, whereof one half is to be paid in 3 months, one quarter in 6 months, and the remainder in 9 months, what is the equated time for the payment of the whole? Ans. 5 months and 7½ days.

3. C owes D 1400 dollars, to be paid in 3 months, but D being in want of money, C pays him at the expiration of 2 months, 1000 dollars, how much longer than 3 months ought C, in equity, to defer the payment of the rest?

Ans. 2½ months.

4. The sales of a consignment of goods became due, viz.

$267	on the	1st of March.
216		10th of May.
135		4th of July.
162		16th of August.

Required the equated, or mean time of payment.

267 due at present, or the first payment.

216×70 days	15120
135×125	16875
162×168	27216
780	780)59211

Ans. 76 days from the 1st of March, which is the 16th of May—or thus,

March 1	$267×70	18690
May 10	216	
	483×55	26565
July 4	135	
	618×43	26574
Aug. 16	162	
	780	780)71829

Ans. 92 days previous to the 16th of August, which gives the mean time, May 16th as before.

If the times of payment be not in regular succession, they should be so placed previous to the calculation; noting the first or earliest time of payment, and then taking the others as they become due.

A pays the balance in cash, on being allowed interest for the time at 6 per cent. per annum as discount. Required the discount and balance, and a mercantile statement.

B		*Cr.*
By 178 quintals Fish . . .	at 25*s.* N. E.	$741,66
By 72 " " . . .	15*s.* 6*d.*	186,00
By 20 Bbls. No. 1 Mackerel . .	$5,70	114,00
		$1041,66

Dr.		
To Cash		$100,00
To 179 gallons Molasses . .	at 3*s.* 8*d.*	109,39
To 120 " Brandy . .	7*s.* 6*d.*	150,00
To *Discount* allowed		10,23
To Cash for *balance*		672,04
		$1041,66

4. B has C's note for 250 dols. with 6 months interest due on it, and to redeem it C delivers him 60 bushels of wheat at $1,25 per bushel; 50 bushels of corn at 87½ cts. per bushel, and the balance in staves at 30 dols. per thousand; what number of staves did B receive?

Ans. 5550 staves, or 4 m. 6 hun. and 10 casts.

5. C has nutmegs worth 7*s.* 6*d.* per lb. in ready money, but in barter he will have 8*s.*; D has tobacco worth 9*d.* per lb.; how much must he rate it per lb. that his profit may be equal to C's? Ans. 9⅗*d.*

6. A has tea which he barters with B at 10*d.* per lb. more than it cost him, against cambrick which stands B in 10*s.* per yard, but he puts it at 12*s.* 6*d.*; I would know the first cost of the tea? Ans. 3*s.* 4*d.* per lb.

7. A has 240 bushels of rye, which cost him 90 cts. per bushel; this he barters with B at 95 cts. for wheat that stands B in 99 cts. per bushel; how many bushels of wheat is he to receive in barter, and at what price is it to be rated, that their gains may be equal?

Ans. $218\frac{38}{200}$ bushels, at $104\frac{1}{2}$ cts. per bushel.

8. A and B barter some goods—A put his at $30\frac{6}{25}$ shillings, and gains 8 per cent.; B puts his at $24\frac{3}{10}$ shillings, and gains at the same rate; what was the first cost of the goods? Ans. 28*s.* and 22*s.* 6*d.*

9. A and B barter—A has cloth that cost 28*d.* B's cost him 22*d.* and he puts it at 25*d.*; how high must A put his to gain 10 per. cent more than B? Ans. 35*d.*

10. C and D barter—C makes of 7*s.* 6*s.* 8*d.*; D makes of 7*s.* 6*d.* 7*s.* 3*d.*; who has lost most, and by how much per cent.? Ans. C loses $1\frac{3}{4}$ per cent. more than D.

LOSS AND GAIN

Is a rule that discovers what is gained or lost in buying or selling goods, and instructs merchants and traders to raise or fall the price of their goods so as to gain or lose so much per cent. &c.

EXAMPLES.

1. Bought a piece of broadcloth containing 53 yards, at 4 dols. 65 cts. per yard, and sold it at 5 dols. per yard; what is the profit on the whole? Ans. $18,55.

2. Bought a piece of baize of 42 yards, for £4 14 6, and sold it at 2*s.* 6*d.* per yard; what is the gain or loss on the whole piece? Ans. 10*s.* 6*d.* gain.

3. When 20 per cent. loss is made on coffee sold at 20 cts. per lb. what was the first cost? Ans. 25 cts.

4. At $13\frac{1}{2}$ cents profit on a dollar, how much is it per cent.? Ans. $13\frac{1}{2}$ per cent. or 13 dols. 50 cts. per 100 dols.

5. A trader sells his goods for $2\frac{1}{2}$*d.* profit on the shilling, how much is it per cent.? Ans, $20\frac{5}{6}$, or £20 16 8.

6. Which is the better bargain, in purchasing fish, 17 shillings per quintal, and 4 months credit, or 16*s.* 8*d.* cash? Ans. They are alike.

PROOF. The present worth of 17*s.* found by discount, is equal to 16*s.* 8*d.* and 16*s.* 8*d.* with 4 months interest will amount to 17*s.*

7. A bought a piece of shalloon, containing 34 yards, at 3*s.* 4*d.* per yard, and sold it at $12\frac{1}{2}$ per cent. loss, for how much did he sell it per yard? Ans. 2*s.* 11*d.*

8. Bought wine at 90 cts. per gallon, at what rate must it be sold to gain 20 per cent.? Ans. 108 cents.

9. A vintner buys 596 gallons of wine, at 6*s* 3*d.* per gallon, in ready money, and sells it immediately at 6*s.* 9*d.* per gallon, payable in 3 months, how much is his gain or loss, supposing he allows the interest for the time, at 6 per cent. per annum, as discount for present payment? Ans. £11 17 8 gained.

10. What would be the gain or loss on the aforesaid wine, supposing the discount for present payment to be made at 2 per cent. without any regard to time?

Ans. £10 17 $6\frac{1}{2}$ gain.

ALLIGATION MEDIAL

Is when the quantities and prices of several things are given, to find the mean price of the mixture compounded of those things.

Rule. As the sum of the quantities or whole composition is to their total value, so is any part of the composition to its mean price.

Examples.

1. A grocer would mix 25 lb. of raisins, at 8 cents per lb. and 35 lb. at 10 cents per lb. with 40 lb. at 12 cents per lb.—what is 1 lb. of this mixture worth?

lb.		*cts.*	*cts.*
25	at	8 . .	200
35	. . .	10 . .	350
40	. . .	12 . .	480
100			1030

	lbs.		*cts.*		*lb.*
If	100	:	1030	: :	1
			1		
			1|00)10|30		

cts. 10,3 Ans. 10 cents, 3 mills.

2. A goldsmith mixes 8 lb. 5½ oz. of gold, of 14 carats fine, with 12 lb. 8½ oz of 18 carats fine; what is the fineness of this mixture? Ans. $16\frac{4}{17}$ carats.

3. A grocer would mix 12 cwt. of sugar, at 10 dollars per cwt. with 3 cwt. at 8⅓ dols. per cwt. and 8 cwt. at 7½ dols. per cwt. what will 5 cwt. of this mixture be worth?

Ans. 44 dols. 78 cts. 2 ms.

4. A refiner melts 2½ lb. of gold, of 20 carats fine, with 4 lb. of 18 carats fine; how much alloy must he put to it to make it 22 carats fine?

Ans: It is not fine enough by $3\frac{3}{13}$ carats, so that no alloy must be put to it, but more gold.

5. A maltster mingles 30 quarters of brown malt, at 28*s.* per quarter, with 46 quarters of pale, at 30*s.* per quarter, and 24 quarters of high dried ditto, at 25*s.* per quarter; what is the value of 8 bushels of this mixture?

Ans. £1 8*s.* $2\frac{1}{4}d.$ $\frac{2}{5}$.

ALLIGATION ALTERNATE

Is the method of finding what quantity of any number of simples, whose rates are given, will compose a mixture of a given rate; so that it is the reverse of Alligation Medial, and may be proved by it.

RULE. 1. Write the rates of the simples in a column under each other.

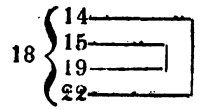
2. Connect or link with a continued line the rate of each simple which is less than that of the compound, with one, or any number, of those that are greater than the compound, and each greater rate with one or any number of the less.

3. Write the difference between the mixture rate and that of each of the simples, opposite the rates with which they are linked.

4. Then if only one difference stand against any rate, it will be the quantity belonging to that rate; but if there be several, their sum will be the quantity.

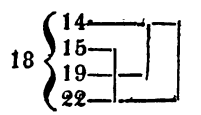
EXAMPLES.

1. A merchant would mix wines at 14*s.* 19*s.* 15*s.* and 22*s.* per gallon, so that the mixture may be worth 18*s.* the gallon; what quantity of each must be taken?



4 at 14*s.*
1 at 15*s.*
3 at 19*s.*
4 at 22*s.*

Or thus,



1+4	5 at 14*s.*
1	1 at 15*s.*
4+3	7 at 19*s.*
4	4 at 22*s.*

NOTE. Questions in this rule admit of a great variety of answers, according to the manner of linking them.

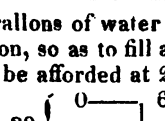
2. How much wine, at 6*s*. per gallon, and at 4*s*. per gallon, must be mixed together, that the composition may be worth 5*s*. per gallon? Ans. 1 qt. or 1 gal. of each, &c.

When the whole composition is limited to a certain quantity.

RULE. Find an answer as before by linking: then say, As the sum of the quantities, or differences thus determined, is to the given quantity, so is each ingredient, found by linking, to the required quantity of each.

EXAMPLES.

1. How many gallons of water must be mixed with wine worth 3*s*. per gallon, so as to fill a vessel of 100 gallons, and that a gallon may be afforded at 2*s*. 6*d*.?



36

36 : 100 : : 6
6

36)600(16
36

240
216

24

36 : 100 : : 30
30

36)3000(83
288

120
108

12

Ans. 83⅓ gallons of wine, and 16⅔ of water.

2. A grocer has currants at 4*d*. 6*d*. 9*d*. and 11*d*. per lb. and he would make a mixture of 240 lb. so that it might be afforded at 8*d*. per lb. how much of each sort must he take?

Ans. 72 lb. at 4*d*. 24 at 6*d*. 48 at 9*d*. and 96 at 11*d*.

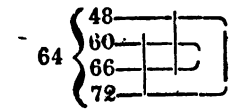
When one of the ingredients is limited to a certain quantity.

RULE. Take the difference between each price and the mean rate as before; then,

As the difference of that simple, whose quantity is given, is to the rest of the differences severally, so is the quantity given, to the several quantities required.

EXAMPLES.

1. How much wine, at 5*s.* at 5*s.* 6*d.* and at 6*s.* the gallon, must be mixed with three gallons, at 4*s.* per gallon, so that the mixture may be worth 5*s.* 4*d.* per gallon?



10 : 10 :: 3 : 3
10 : 20 :: 3 : 6
10 : 20 :: 3 : 6

Ans. 3 gallons at 5*s.*; 6 at 5*s.* 6*d.* and 6 at 6*s.*

2. A grocer would mix teas at 12*s.* 10*s.* and 6*s.* with 20 lb. at 4*s.* per lb.; how much of each sort must he take to make the composition worth 8*s.* per lb.?

Ans. 20 lb. at 4*s.*; 10 lb. at 6*s.*; 10 lb. at 10*s.*; and 20 lb. at 12*s.*

POSITION.

POSITION is a rule, which, by false or supposed numbers, taken at pleasure, discovers the true one required. It is divided into two parts, SINGLE and DOUBLE.

SINGLE POSITION

Is, by using one supposed number, and working with it as the true one, you find the real number required by the following

RULE. As the total of the errors is to the given sum, so is the supposed number to the true one required.

PROOF. Add the several parts of the result together, and if it agrees with the given sum, it is right.

EXAMPLES.

1. A school-master, being asked how many scholars he had, said, If I had as many, half as many, and one quarter as many more, I should have 264; how many had he?

Suppose he had 72
As many . . 72
½ as many . . 36
¼ as many . . 18

As 198 : 264 :: 72

72

	Proof.
528	96
1848	96
	48
198)19008(96 Answer.	24
1782	
	264
1188	
1188	

2. A person, after spending ½ and ¼ of his money, had 60 dollars left; what had he at first? Ans. 144 dols.

3. A certain sum of money is to be divided between 4 persons, in such a manner, that the first shall have ½ of it, the second ⅓, the third ¼, and the fourth the remainder, which is 28 dollars; what was the sum? Ans. 112 dols.

4. A person lent his friend a sum of money unknown, to receive interest for the same, at 6 per cent. per annum, simple interest, and at the end of 5 years he received for principal and interest 644 dollars 80 cents; what was the sum lent? Ans 496 dols.

DOUBLE POSITION

Is, by making use of two supposed numbers, which, if both prove false, are, with their errors, to be thus disposed:

RULE. 1. Place each error against its respective position.

2. Multiply them cross wise.

3. If the errors are alike, that is, both greater or both less than the given number, divide the difference of the products by the difference of the errors, and the quotient is the answer: But if the errors be unlike, divide the sum of the products by the sum of the errors, and the quotient will be the answer.

Examples.

1. B asked C how much his horse cost; C answered, that if he cost him three times as much as he did, and 15 dollars more, he would stand him in 300 dollars; what was the price of the horse?

	dols.		*dols.*
Suppose he cost	90	Suppose he cost	96
	3		3
	270		288
	15		15
	285 too little by 15 dls.		303 too much by 3 dls.

90 15—

X

96 3+

	15	1440	270
	3	270	
Sum of the errors	18)	1710(95 answer.	95
		162	3
		90	285
		90	15
			300 proof.

2. Two persons, A and B, have both the same income; A saves one-fifth of his yearly; but B, by spending 150 dollars per annum, more than A, at the end of 8 years finds himself 400 dollars in debt; what is their income, and what does each spend per annum?

Ans. Their income is 500 dollars per annum; also A spends 400, and B 550 dollars per annum.

3. There is a fish whose head is 9 inches long, and his tail is as long as his head and half his body, and his body is as long as the head and tail; what is the whole length of the fish? Ans. 6 feet.

PROGRESSION

Consists in two parts—ARITHMETICAL and GEOMETRICAL.

ARITHMETICAL PROGRESSION

Is when a rank of numbers increase or decrease regularly, by the continual adding or subtracting of some equal number: As 1, 2, 3, 4, 5, 6, are in Arithmetical Progression by the continual increasing or adding of one, and 11, 9, 7, 5, 3, 1, by the continual decrease or subtraction of two.

NOTE. When any even number of terms differ by Arithmetical Progression, the sum of the two extremes will be equal to the two middle numbers, or any two means equally distant from the extremes: As 2, 4, 6, 8, 10, 12, where 6+8, the two middle numbers, are =12+2. the two extremes, and=10+4 the two means=14.

When the number of terms are odd, the double of the middle term will be equal to the two extremes, or of any two means equally distant from the middle term: As 1, 2, 3, 4, 5, where the double of 3=5+1=2+4=6.

In Arithmetical Progression five things are to be observed, viz.

1. The first term.
2. The last term.
3. The number of terms.
4. The equal difference.
5. The sum of all the terms.

Any three of which being given, the other two may be found.

The first, second and third term given, to find the fifth.

RULE. Multiply the sum of the two extremes by half the number of terms, or multiply half the sum of the two extremes by the whole number of terms, the product is the total of all the terms.

EXAMPLES.

1. How many strokes does the hammer of a clock strike in 12 hours?

12+1=13 *then* 13×6=78. Ans.

2. A man buys 17 yards of cloth, and gave for the first yard 2*s*. and for the last 10*s*. what did the 17 yards amount to? Ans. £5 2*s*.

3. If 100 eggs were placed in a right line, exactly a yard asunder from one another, and the first a yard from a basket, what length of ground does that man go who gathers up these 100 eggs singly, returning with every egg to the basket to put it in? Ans. 5 miles, 1300 yards.

The first, second and third terms given, to find the fourth.

RULE. From the second subtract the first, the remainder divided by the third, less one, gives the fourth.

EXAMPLES.

1. A man had 8 sons, the youngest was 4 years old, and the eldest 32, they increase in Arithmetical Progression, what was the common difference of their ages? Ans. 4.

32—4=28 then 28÷8—1=4 the common difference.

2. A man is to travel from Boston to a certain place in 12 days, and to go but 3 miles the first day, increasing every day by an equal excess, so that the last day's journey may be 58 miles, what is the daily increase, and how many miles distant is that place from Boston? Ans. 5 miles daily increase.

Therefore as 3 miles is the first day's journey;

3+5= 8 second ditto.

8+5=13 third ditto, &c.

The whole distance is 366 miles.

The first, second and fourth terms given, to find the third.

RULE. From the second subtract the first, the remainder divide by the fourth, and to the quotient add 1, gives the third.

EXAMPLES.

1. A person travelling into the country, went 3 miles the first day, and increased every day by 5 miles, till at last he went 58 miles in one day, how many days did he travel? Ans. 12.

58—3=55 then 55÷5=11 and 11+1=12 the number of days.

2. A man being asked how many sons he had, said that the youngest was 4 years old, and the eldest 32, and that he increased one in his family every 4 years, how many had he? Ans. 8.

The second, third and fourth given, to find the first.

RULE. Multiply the fourth by the third, made less by 1, the product subtracted from the second, gives the first.

EXAMPLES.

1. A man in 10 days went from Boston to a certain town in the country, every day's journey increasing the former by 4, and the last day he went was 46 miles, what was the first? Ans. 10 miles.

4×10—1=36 then 46—36=10, the first day's journey.

2. A man takes out of his pocket at 8 several times, so many different numbers of shillings, every one exceeding the former by 6; the last 46, what was the first? Ans. 4.

The second, third and fifth given, to find the first.

RULE. Divide the fifth by the third and from the quotient subtract half the product of the fourth, multiplied by the third less 1, gives the first.

EXAMPLE.

A man is to receive £360 at 12 several payments, each to exceed the former by £4, and is willing to bestow the first payment on any one that can tell him what it is; what will that person have for his pains? Ans. £8.

$$360 \div 12 = 30 \text{ then } 30 - \frac{4 \times 12 - 1}{2} = 8 \text{ the first payment.}$$

The first, third and fourth given, to find the second.

RULE. Subtract the fourth from the product of the third, multiplied by the fourth, that remainder added to the first gives the second.

EXAMPLE.

What is the last number of an Arithmetical Progression, beginning at 6, and continuing by the increase of 8 to 20 places? Ans. 158.

$20 \times 8 - 8 = 152$ then $152 + 6 = 158$, the last number.

GEOMETRICAL PROGRESSION

Is the increasing or decreasing of any rank of numbers by some common ratio, that is, by the continual multiplication or division of some equal number: As 2, 4, 8, 16, increase by the multiplier 2, and 16, 8, 4, 2, decrease by the divisor 2.

NOTE. When any number of terms is continued in Geometrical Progression, the product of the two extremes will be equal to any two means, equally distant from the extremes:

As 2, 4, 8, 16, 32, 64, where $64 \times 2 = 4 \times 32 = 8 \times 16 = 128$.

When the number of terms are odd, the middle term multiplied into itself will be equal to the two extremes, or any two means, equally distant from the mean: As 2, 4, 8, 16, 32, where $2 \times 32 = 4 \times 16 = 8 \times 8 = 64$.

In Geometrical Progression the same five things are to be observed, as in Arithmetical, viz.

1. The first term.
2. The last term.
3. The number of terms.
4. The equal difference or ratio.
5. The sum of all the terms.

NOTE. As the last term in a long series of numbers, is very tedious to come at, by continual multiplication; therefore, for the readier finding it out, there is a series of numbers, made use of in Arithmetical Proportion, called indices, beginning with an unit, whose common difference is one; whatever number of indices you make use of, set as many numbers (in such Geometrical Proportion as is given in the question,) under them:

As 1, 2, 3, 4, 5, 6 indices.
2, 4, 8, 16, 32, 64 numbers in Geometrical Proportion.

But if the first term in Geometrical Proportion be different from the ratio, the indices must begin with a cipher:

As 0, 1, 2, 3, 4, 5, 6 indices.
1, 2, 4, 8, 16, 32, 64 numbers in Geometrical Proportion.

When the indices begin with a cipher, the sum of the indices made choice of must be always one less than the number of terms given in the question, for 1 in the indices is over the second term, and 2 over the third, &c.

Add any two of the indices together, and that sum will agree with the product of their respective terms.

As in the first table of indices	2+ 5= 7
Geometrical Proportion	4×32=128
Then in the second	2+ 4= 6
	4×16= 64

In any Geometrical Progression proceeding from unity, the ratio being known, to find any remote term, without producing all the intermediate terms.

RULE. Find what figures of the indices added together would give the exponent of the term wanted, then multiply the numbers standing under such exponent into each other, and it will give the term required.

NOTE. When the exponent 1 stands over the second term, the number of exponents must be one less than the number of terms.

EXAMPLES.

1. A man agrees for 12 peaches, to pay only the price of the last, reckoning a farthing for the first, a halfpenny for the second, &c. doubling the price to the last, what must he give for them?

0, 1, 2, 3, 4, exponents.
1, 2, 4, 8, 16, number of terms.

4+4+3=11, number of terms less 1.

16=4
16=4
256=8
8=3
4)2048=11 numb. farth.
12)512
20)42 8
Ans. £2 2s. 8d.

2. A country gentleman, going to a fair to buy some oxen, meets with a person who had 23, he demanding the price of them, was answered £16 apiece; the gentleman bids him £15 apiece, and he would buy all; the other tells him it would not be taken, but if he would give what the last ox would come to, at a farthing for the first, and doubling it to the last, he should have all. What was the price of the oxen? Ans. £4369 1*s.* 4*d.*

In any Geometrical Progression, not proceeding from unity, the ratio being given, to find any remote term, without producing all the intermediate terms.

RULE. Proceed as in the last, only observe that every product must be divided by the first term.

EXAMPLES.

1. A sum of money is to be divided among eight persons, the first to have £20, the second £60, and so on in triple proportion, what will the last have?

$$\begin{array}{llllll} 0. & 1. & 2. & 3. & \frac{540\times540}{20}=14580 \text{ then} & \frac{14580\times60}{20}=43740 \\ 20. & 60. & 180. & 540. & & \end{array}$$

Ans. £43740.

3+3+1=7 one less than the number of terms.

2. A gentleman, dying, left 9 sons, to whom and to his executor, he bequeathed his estate in manner following: To his executor £50; his youngest son was to have as much more as the executor, and each son to exceed the next younger by as much more; what was the eldest son's portion? Ans. £25600.

The first term, ratio, and number of terms given, to find the sum of all the terms.

RULE. Find the last term as before, then subtract the first from it, and divide the remainder by the ratio less one, to the quotient of which add the greater, and it gives the sum required.

EXAMPLES.

1. A servant skilled in numbers agreed with a gentleman to serve him 12 months, provided he would give him a farthing for his first month's services, a penny for the second, and 4*d.* for the third, &c.—what did his wages amount to?

256×256=65536, then 65536×64=4194304

$$\begin{array}{llllll} 0. & 1. & 2. & 3. & 4. & \frac{4194304-1}{4-1}=1398101; \text{ then} \\ 1. & 4. & 16. & 64. & 256. & \end{array}$$

(4+4+3=11. No. of terms less 1.) 1398101+4194304=5592405 farthings.

Ans. £5825 8*s.* 5¼*d.*

2. A man bought a horse, and by agreement was to give a farthing for the first nail, three for the second, &c.; there were 4 shoes, and in each shoe 8 nails: what was the worth of the horse? Ans. £9651146816931 13*s.* 4*d.*

3. A certain person married his daughter on new-year's day, and gave her husband one shilling towards her portion, promising to double it on the first day of every month for one year; what was her portion? Ans. £204 15*s.*

PERMUTATION

Is the changing or varying of the order of things.

Rule. Multiply all the given terms one into another, and the last product will be the number of changes required.

Examples.

1. How many changes may be rung upon 12 bells, and how long would they be ringing but once over, supposing 10 changes might be rung in one minute, and the year to contain 365 days 6 hours?

1×2×3×4×5×6×7×8×9×10×11×12=479001600 changes, which÷10=47900160 minutes, and if reduced is=91 years 3 weeks 5 days and 6 hours.

2. A young scholar coming into a town for the conveniency of a good library, demands of a gentleman with whom he lodged, what his diet would cost for a year, who told him £10; but the scholar not being certain what time he should stay, asked him what he must give him for so long as he could place his family (consisting of 6 persons besides himself) in different positions, every day at dinner; the gentleman, thinking it could not be long, tells him £5, to which the scholar agrees; what time did the scholar stay with the gentleman? Ans. 5040 days.

EXTRACTION OF THE SQUARE ROOT.

Extraction of the Square Root is to find out such a number as being multiplied into itself, the product will be equal to the given number.

Rule. 1. Point the given number, beginning at the unit's place, then to the hundreds', and so upon every second figure throughout.

2. Seek the greatest square number in the first point, towards the left hand, placing the square number under the first point, and the root thereof in the quotient; subtract the square number from the first point, and to the remainder bring down the next point, and call that the resolvend.

3. Double the quotient, and place it for a divisor on the left hand of the resolvend; seek how often the divisor is contained in the resolvend (reserving always the unit's place) and put the answer in the quotient, and also on the right hand side of the divisor; then multiply by the figure last put in the quotient, and subtract the product from the resolvend; bring down the next point to the remainder (if there be any more) and proceed as before.

ROOTS.	1.	2.	3.	4.	5.	6.	7.	8.	9.
SQUARES.	1.	4.	9.	16.	25.	36.	49.	64.	81.

EXAMPLES.

1. What is the square root of 119025?

```
                . . .
            119025(345
              9
            -------
            64)290
               256
            -------
            685)3425
                3425
```

Ans. 345.

2. What is the square root of 106929? Ans. 327.

3. What is the square root of 2268741? Ans. 1506,23+

When the given number consists of a whole number and decimals together, make the number of decimals even, by adding ciphers to them, so that there may be a point fall on the unit's place of the whole number.

4. What is the square root of 3271,4007? Ans. 57,19+

5. What is the square root of 4795,2571? Ans. 69,247+

To extract the square root of a vulgar fraction.

RULE. Reduce the fraction to its lowest terms, then extract the square root of the numerator for a new numerator, and the square root of the denominator for a new denominator.

If the fraction be a surd, (i. e.) a number whose root can never be exactly found, reduce it to a decimal, and extract the root from it.

EXAMPLES.

6. What is the square root of $\frac{2304}{1764}$? Ans. $\frac{4}{3}$.

SURDS.

7. What is the square root of $\frac{176}{361}$? Ans. ,89802+

To extract the square root of a mixed number.

RULE. 1. Reduce the fractional part of a mixed number to its lowest term, and then the mixed number to an improper fraction.

2. Extract the roots of the numerator and denominator for a new numerator and denominator.

If the mixed number given be a surd, reduce the fractional part to a decimal, annex it to the whole number, and extract the square root therefrom.

EXAMPLES.

8. What is the square root of $51\frac{21}{25}$? Ans. $7\frac{1}{5}$.

9. What is the square root of $27\frac{9}{16}$? Ans. $5\frac{1}{4}$.

SURDS.

10. What is the square root of $85\frac{1}{2}$? Ans. 9,27+

11. What is the square root of $8\frac{5}{7}$? Ans. 2,9519+

THE APPLICATION.

1. There is an army consisting of a certain number of men, who are placed rank and file, that is, in the form of a square, each side having 576 men, I desire to know how many the whole square contains? Ans. 331776.

2. A certain pavement is made exactly square, each side of which contains 97 feet, I demand how many square feet are contained therein? Ans 9409.

To find a mean proportional between any two given numbers.

RULE. The square root of the product of the given number is the mean proportional sought.

1. What is the mean proportional between 3 and 12?

Ans. $3\times12=36$ then $\sqrt{36}=6$ the mean proportional.

2. What is the mean proportional between 4276 and 842?

Ans. 1897,4+

To find the side of a square equal in area to any given superfices.

RULE. The square root of the content of any given superfices, is the equal square sought.

EXAMPLES.

1. If the content of a given circle be 160, what is the side of the square equal? Ans. 12,64911.

2. If the area of a circle is 750, what is the side of the square equal? Ans. 27,38612.

The area of a circle given, to find the diameter.

RULE. As 355 : 452, or as 1 : 1,273239 : : so is the area: to the square of the diameter;—or, multiply the square root of the area by 1,12837, and the product will be the diameter.

EXAMPLE.

What length of cord will fit to tie to a cow's tail, the other end fixed in the ground, to let her have liberty of eating an acre of grass, and no more, supposing the cow and tail to be 5 yards and a half? Ans. 6,136 perches.

The area of a circle given, to find the periphery or circumference.

RULE. As 113 : 1420, or as 1 : 12,56637 : : the area: to the square of the periphery, or multiply the square root of the area by 3,5449, and the product is the circumference.

EXAMPLES.

1. When the area is 12, what is the circumference? Ans. 12,2798.

2. When the area is 160, what is the periphery? Ans. 44,84.

Any two sides of a right angled triangle given, to find the third side.

The base and perpendicular given, to find the hypotenuse.

RULE. The square root of the sum of the squares of the base and perpendicular is the length of the hypotenuse.

EXAMPLES.

1. The top of a castle from the ground is 45 yards high, and is surrounded with a ditch 60 yards broad; what length must a ladder be to reach from the outside of the ditch to the top of the castle? Ans. 75 yards.

2. The wall of a town is 25 feet high, which is surrounded by a moat of 30 feet in breadth, I desire to know the length of a ladder that will reach from the outside of the moat to the top of the wall. Ans. 39,05 feet.

The hypotenuse and perpendicular given, to find the base.

RULE. The square root of the difference of the squares of the hypotenuse and perpendicular is the length of the base.

The base and hypotenuse given, to find the perpendicular.

RULE. The square root of the difference of the squares of the hypotenuse and base is the height of the perpendicular.

N. B. The two last questions may be varied for examples to the two last propositions.

Any number of men being given, to form them into a square battle, or to find the number of ranks and files.

RULE. The square root of the number of men given, is the number of men either in rank or file.

1. An army consists of 331776 men, I desire to know how many in rank and file? Ans. 576.

2. A certain square pavement contains 48841 square stones, all of the same size, I demand how many are contained in one of the sides? Ans. 221.

To find the area of a piece of land in form of a triangle.

RULE. Add together the three sides, from half their sum subtract each side, and note the remainder, then multiply the half sum by one of those remainders, and that product by another remainder; the square root of the last product will be the area.

EXAMPLE.

Suppose a triangular piece of land, whose sides are 24, 16 and 12 rods, what is the area?

24+16+12=52÷2=26 for half.

26—24= 2 then 26×2×10×14=7280, the square

26—16=10 root of which is 85,32+ Rods.

26—12=14

Multiplying the longest side by half of the nearest distance, to its opposite angle; or, multiplying the longest side by the nearest distance to its opposite angle and taking half of the product, gives the area.

EXAMPLE.

If the three sides of a piece of land in form of a triangle be 15, 14, and 13 rods, required the area?

The nearest distance would be 11,2 rods.

half=	5,6	
longest side	15	
Ans.	84,0 Rods.	

Or, 11,2

15

2)168,0

Ans. 84,0 Rods, as before.

If the three sides be 120,5, 112,6 and 90,3 rods, required the area?

Ans. 4832,7 Rods=30 Acres and $32\frac{7}{160}$ perches.

Any irregular four-sided piece of land may be divided into two triangles by a diagonal line, and a five-sided piece into three triangles by two diagonals. If the length of the sides be agreed on, there can be no dispute on the admeasurement, as all who are acquainted with the rule will agree in the result.

EXTRACTION OF THE CUBE ROOT.

To extract the Cube Root is to find out a number, which being multiplied into itself, and then into that product, produceth the given number.

RULE. 1. Point every third figure of the cube given, beginning at the unit's place, seek the greatest cube to the first point and subtract it therefrom, put the root in the quotient, and bring down the figures in the next point to the remainder for a resolvend.

2. Find a divisor by multiplying the square of the quotient by 3. See how often it is contained in the resolvend, rejecting the units and tens, and put the answer in the quotient.

3. To find the *subtrahend*. 1. Cube the last figure in the quotient. 2. Multiply all the figures in the quotient by 3, except the last, and that product by the square of the last. 3. Multiply the divisor by the last figure. Add these products together, gives the subtrahend, which subtract from the resolvend; to the remainder bring down the next point, and proceed as before.

Roots.	1.	2.	3.	4.	5.	6.	7.	8.	9.
Cubes.	1.	8.	27.	64.	125.	216.	343.	512.	729.

EXAMPLE.

What is the cube root of 99252847?

99252847(463
64=Cube of 4.

Divisor.
Square of 4×3=48)35252 Resolvend.

216=Cube of 6
432 =4×3×by square of 6
288 =Divisor × by 6

33336 Subtrahend

Divisor.
Square of 46×3=6348)1916847 Resolvend

27=Cube of 3
1242 =46×3×by square of
19044 =Divisor × by 3

1916847 Subtrahend.

Another new and more concise method of extracting the Cube Root.

RULE. 1. Point every third figure of the cube given, beginning at the unit's place, then find the nearest cube to the first point, and subtract it therefrom, put the root in the quotient, bring down the figures in the next point to the remainder for a resolvend.

2. Square the quotient and triple the square for a divisor—as, 4×4×3=48. Find how often it is contained in the resolvend, rejecting units and tens, and put the answer in the quotient.

3. Square the last figure in the quotient, and put it on the right hand of the divisor:

As 6×6=36 put to the divisor 48=4836.

4. Triple the last figure in the quotient, and multiply by the former, put it under the other, units under the tens, add them together, and multiply the sum by the last figure in the quotient, subtract that product from the resolvend, bring down the next point, and proceed as before.

EXAMPLES.

1. What is the cube root of 99252847?

Square of 4×3=48 divisor. 99252847(463
Square of 6 put to 48=4836 64
6×3×4 = 72 ——
35252
5556 × 6 = 33336
Square of 46=2116×3=6348 div. ——
Square of 3=9 put to 6348=*634809 1916847
3×3×46= 414
——
638949×3=1916847

2. What is the cube root of 389017? Ans. 73.
3. What is the cube root of 5735339? Ans. 179.

When the given number consists of a whole number and decimal together, make the number of decimals to consist of 3, 6, 9, &c. places, by adding ciphers thereto, so that there may be a point fall on the unit's place of the whole number.

4. What is the cube root of 12,977875? Ans. 2,35
5. What is the cube root of 36155,027576? Ans. 33,06+

* When the quotient is 1, 2, or 3, there must be a cipher put to supply the place of tens.

To extract the cube root of a vulgar fraction.

RULE. Reduce the fraction to its lowest terms, then extract the cube root of the numerator and denominator for a new numerator and denominator; but if the fraction be a surd, reduce it to a decimal, and then extract the root from it.

EXAMPLES.

1. What is the cube root of $\frac{343}{512}$? Ans. $\frac{7}{8}$.

SURD.

2. What is the cube root of $\frac{1}{4}$? Ans. ,829+

To extract the cube root of a mixed number.

RULE. Reduce the fractional part to its lowest terms, and then the mixed number to an improper fraction, extract the cube roots of the numerator and denominator for a new numerator and denominator; but if the mixed number given be a surd, reduce the fractional part to a decimal, annex it to the whole number, and extract the root therefrom.

EXAMPLES.

1. What is the cube root of $12\frac{167}{343}$? Ans. $2\frac{1}{3}$.

SURD.

2. What is the cube root of $7\frac{1}{2}$? Ans. 1,93+

THE APPLICATION.

1. If a cubical piece of timber be 47 inches long, 47 inches broad, and 47 inches deep, how many cubical inches doth it contain? Ans. 103823.

2. There is a cellar dug that is 12 feet every way, in length, breadth, and depth, how many solid feet of earth were taken out of it? Ans. 1728.

To find the side of a cube that shall be equal in solidity to any given solid, as a globe, cylinder, prism, cone, &c.

RULE. The cube root of the solid content of any solid body given is the side of the cube of equal solidity.

EXAMPLE.

If the solid content of a globe is 10648, what is the side of a cube of equal solidity? Ans. 22.

The side of the cube being given, to find the side of that cube, that shall be double, treble, &c. in quantity to the given cube.

RULE. Cube the side given, and multiply it by 2, 3, &c. the cube root of the product is the side sought.

EXAMPLE.

There is a cubical vessel, whose side is 12 inches, and it is required to find the side of another vessel that is to contain three times as much? Ans. 17,306.

EXTRACTION OF THE BIQUADRATE ROOT.

To extract the Biquadrate Root is to find out a number, which being involved four times into itself, will produce the given number.

RULE. First extract the square root of the given number, then extract the square root of that square root, and it will give the biquadrate root required.

EXAMPLES.

1. What is the biquadrate of 27? Ans. 531441.
2. What is the biquadrate root of 531441? Ans. 27.

A GENERAL RULE

FOR EXTRACTING THE ROOTS OF ALL POWERS.

1. PREPARE the number given for extraction, by pointing off from the unit's place as the root required directs.
2. Find the first figure in the root, by the table of powers, which subtract from the given number.
3. Bring down the first figure in the next point to the remainder, and call it the dividend.
4. Involve the root into the next inferior power to that which is given; multiply it by the given power, and call it the divisor.
5. Find a quotient figure by common division, and annex it to the root; then involve the whole root into the given power, and call that the subtrahend.
6. Subtract that number from as many points of the given power as is brought down, beginning at the lowest place, and to the remainder bring down the first figure of the next point for a new dividend.
7. Find a new divisor, and proceed in all respects as before.

EXAMPLES.

1. What is the square root of 141376 ? Ans. 376.
2. What is the cube root of 53157376 ? Ans. 376.
3. What is the biquadrate root of 19987173376 ? Ans. 376.

DUODECIMALS.

DUODECIMALS, or Cross Multiplication, is a rule made use of in measuring and computing the dimensions of the several parts of buildings; it is likewise used to find ships' tonnage and the contents of bales, cases, &c.

Dimensions are taken in feet, inches, and parts.

Artificers' work is computed by different measures, viz.

Glazing, and masons' flat work, by the foot.

Painting, paving, plastering, &c. by the yard.

Partitioning, flooring, roofing, tiling, &c. by the square of 100 feet.

A perch of masons' work is 24¾ feet.

A square or cubic fathom is 216 feet.

The contents of bales, cases, &c. by the ton of 40 cubic feet.

The tonnage of ships, by the ton of 95 feet.

RULE FOR MULTIPLYING DUODECIMALLY.

1. Under the multiplicand write the corresponding denominations of the multiplier.

2. Multiply each term in the multiplicand, (beginning at the lowest) by the feet in the multiplier; write each result under each respective term, observing to carry an unit from each lower denomination to its superior.

3. In the same manner, multiply the multiplicand by the inches in the multiplier, and write the result of each term, one place more to the right hand of them, in the multiplicand.

4. Work in the same manner with the other parts in the multiplier, setting the result of each term two places to the right hand of those in the multiplicand, and so on for thirds, fourths, &c.

5. Proceed in the like manner with all the rest of the denominations, and their sum will give the answer required.

EXAMPLES.

1. Multiply 4 feet 9 inches by 8 inches.

4	9
	8
3	2

Ans. 3 feet 2 inches.

2. Multiply 9 feet 6 inches by 4 feet 9 inches.

		ft.	*in.*
		9	6
		4	9
ft.	*in.*		
9	6×4 feet =	38	0
9	6×9 inc. =	7	1 6
		45	1 6

Ans. 45 feet 1 inch and 6 twelfths.

3. In a load of wood 8 feet 4 inches long, 4 feet 3 inches wide, 3 feet 6 inches high, how many cubic or solid feet?

8 4
3 6
25 0
6 ½ 4 2
29 2
4 3
116 8
3 ½ 7 3½

16)124 (7 feet.
112
12
4

16)48(3 quarters.
48

Ans. 7¾ feet.

		ft.	*in.*	*ft.*	*in.*	*ft.*	*in.*		*cords.*	*ft.*
4.	A load	10	5	5	4	4	4	Ans.	1	7
5.	"	12	7	7	6	4	8		3	3½
6.	"	11	8	6	6	5	6		3	2
7.	"	22	6	7	4	6	6		8	3

8. What is the price of a marble slab, whose length is 5 feet 7 inches, and breadth 1 foot 10 inches, at one dollar per foot. Ans. 10 dols. 23 cents.

9. There is a house with three tiers of windows, 3 in a tier, the height of the first tier is 7 feet 10 inches, of the second 6 feet 8 inches, and of the third 5 feet 4 inches, and the breadth of each is 3 feet 11 inches; what will the glazing come to, at 14*d.* per foot? Ans. £13 11*s.* 10½*d.*

10. If a house measures within the walls 52 feet 8 inches in length, and 30 feet 6 inches in breadth, and the roof be of a true pitch or the rafters $\frac{3}{4}$ of the breadth of the building, what will it come to, roofing at 10*s.* 6*d.* per square?

Ans. £12 12*s.* 11$\frac{3}{4}$*d.*

APPLICATION OF DUODECIMALS.

To find how many cubic or solid square feet (in order to ascertain the freight) are contained in cases, bales, &c. that is, how many cubic feet they will take up in a ship.

Examples.

1. Suppose the dimensions of a bale be 7 feet 6 inches, 3 feet 3 inches, and 1 foot 10 inches; what is the solid content? Ans. 44 feet 8 inches.

2. What is the freight of a bale containing 65 feet 9 inches, at 15 dols. per ton of 40 feet, or 37$\frac{1}{2}$ cts. per foot?

Ans. $24,65$\frac{1}{2}$ cts.

3. A merchant imports from London 6 bales of the following dimensions, viz.

	Length.		Height.		Depth.	
	ft.	*in.*	*ft.*	*in.*	*ft.*	*in.*
No. 1.	2	10	2	4	1	9
2.	2	10	2	6	1	3
3.	3	6	2	2	1	8
4.	2	10	2	8	1	9
5.	2	10	2	6	1	9
6.	2	11	2	8	1	8

4. What are the solid contents, and how much will the freight amount to, at 20 dollars per ton? The contents are, viz.

	ft.	*in.*
No. 1.	11	7
2.	8	10
3.	12	7
4.	13	2
5.	12	5
6.	13	0
	71	7

Ans. $35,79.

To find Ships' Tonnage by Carpenters' Measure.

RULE. For single decked vessels, multiply the length, breadth at the main beam, and depth of the hold together, and divide the product by 95.

EXAMPLE.

What is the tonnage of a single decked vessel, whose length is 60 feet, breadth 20 feet, and depth 8 feet?

$$60\times20=1200\times8=9600$$

$$\frac{9600}{95}=101\tfrac{5}{95}\text{ tons.}$$

This is the usual method of tonnaging a single decked vessel, having the deck bolted to the wale. But if it be required that the deck be bolted at any height above the wale, and there is no special agreement, the custom is to pay the carpenter for one half of the additional height, to which the deck may be thus raised; that is, one half of the difference being added to the former depth gives the depth to be used in calculating the tonnage.

EXAMPLE.

A merchant, after having contracted with a carpenter to build a single-decked vessel of 60 feet keel, 20 feet beam, and 8 feet hold, desires that the deck be laid for 10 feet hold; required the tonnage to be paid for?

60 length
20 breadth

1200

1=½ diff. of depth + 8=9

10800(113$\frac{85}{95}$ tons.
95=118

RULE. For a double-decked vessel, take half the breadth of the main beam for the depth of the hold, and work as for a single-decked vessel.

EXAMPLE.

1. What is the tonnage of a double-decked vessel, whose length is 65 feet, and breadth 21 feet 6 inches?

65×21 6= 1397 6

1397 6×10 9=15023

$$\frac{15023}{95}=158\tfrac{23}{95}\text{ tons.}$$

To find the Government Tonnage.

"If the vessel be double-decked, take the length thereof from the fore part of the main stem, to the after part of the stern post, above the upper deck; the breadth thereof at the broadest part above the main wales, half of which breadth shall be accounted the depth of such vessel, and then deduct from the length, three-fifths of the breadth, multiply the remainder by the breadth and the product by the depth, and divide this last product by 95, the quotient whereof shall be deemed the true contents or tonnage of such ship or vessel; and if such ship or vessel be single-decked, take the length and breadth, as above directed, deduct from the said length three-fifths of the breadth, and take the depth from the under side of the deck plank to the ceiling in the hold, then multiply and divide as aforesaid, and the quotient shall be deemed the tonnage."

EXAMPLES.

1. What is the government tonnage of a single-decked vessel, whose length is 69 feet 6 inches, breadth 22 feet 6 inches, and depth 8 feet 6 inches?

$\frac{3}{5}$ of 22 6 = 13 6 69 6—13 6 = 56 0

$$\frac{56\times22\ 6\times8\ 6=10710}{95}=112\tfrac{70}{95}\text{ tons.}$$

2. What is the government tonnage of a double-decked vessel, of the following dimensions, length 75 feet 6 inches, breadth 23 feet 4 inches, and depth 11 feet 8 inches?

$\frac{3}{5}$ of 23 4 = 14 0

75 6—14 0 = 61 6

$$\frac{61\ 6\times23\ 4\times11\ 8=16741}{95}=176\tfrac{31}{95}\text{ tons.}$$

The tonnage may be found by using a table of logarithms, the inches being reduced to decimals, as in the following example.

What is the government tonnage of the ship London, the keel of which is 112 feet, and the beam 28 feet 7 inches.

	112	0
$\frac{3}{4}$ of Beam	17	$1\frac{1}{2}$
	94	$10\frac{1}{2}$

	ft.		
Length	94,85	. .	1,977037
Beam	28,58	. .	1,456062
$\frac{1}{2}$ do.	14,29	. .	1,155032
Arithmetical complement of 95		. .	8,022276 fixed number.
			12,610407

Rejecting 10 is 2,610407, Giving $407\frac{1}{12}$ tons.

Carpenters' Measure.

Keel.		Beam.		Hold.			Tons.	95ths.
38	feet	15 ft.	8 ins.	5 ft.	6 ins.	Single Deck	34	53
51	6	21	9	8	3	. . . . .	97	26
51	2	21	1	8	2	. . . . .	92	69
48	$8\frac{1}{2}$	18	8	8	2	. . . . .	78	15
70	6	25	$6\frac{1}{2}$	Double Deck		. . .	242	6
93	8	30	5	. . . . .			456	8
68	0	22	7	. . . . .			182	53
85	4	26	$11\frac{1}{2}$	. . . . .			326	37

Government Measure.

68	6	19	$4\frac{3}{4}$	10	$2\frac{1}{2}$	Single Deck . .	118	42
63	8	19	3	8	0	. . . . .	84	47
63	9	18	$7\frac{1}{2}$	7	9	. . . . .	79	88
65	0	18	6	7	9	. . . . .	81	32
112	0	28	7	Double Deck		. . .	407	81
100	4	26	7	. . . . .			313	80
99	8	27	2	. . . . .			323	78
106	2	26	1	. . . . .			324	6
108	2	26	10	. . . . .			348	82
108	2	27	$0\frac{1}{2}$	. . . . .			355	80

TABLES OF CORDAGE.

A CORDAGE TABLE, *shewing how many fathoms, feet and inches of a Rope, of any size, not more than* 14 *inches, make a hundred weight; with the use of the table.*

Inches.	Fathoms	Feet.	Inches.	Inches.	Fathoms	Feet.	Inches.	Inches.	Fathoms	Feet.	Inches.	Inches.	Fathoms	Feet.	Inches.
1	486	0	0	4¼	26	5	3	7½	8	4	0	10¾	4	1	8
1¼	313	3	0	4½	24	0	0	7¾	8	3	6	11	4	0	3
1½	216	3	0	4¾	21	3	0	8	7	3	6	11¼	3	5	7
1¾	159	3	0	5	19	3	0	8¼	7	0	8	11½	3	4	1
2	124	3	0	5¼	17	4	0	8½	6	4	3	11¾	3	3	3
2¼	96	2	0	5½	16	1	0	8¾	6	2	1	12	3	2	3
2½	77	3	0	5¾	14	4	6	9	6	0	0	12¼	3	2	1
2¾	65	4	0	6	13	3	0	9¼	5	4	0	12½	3	2	0
3	54	0	0	6¼	12	2	0	9½	5	2	0	12¾	2	7	8
3¼	45	5	2	6½	11	3	0	9¾	5	0	6	13	2	5	3
3½	39	3	0	6¾	10	4	0	10	4	5	0	13¼	2	4	9
3¾	34	3	9	7	9	5	6	10¼	4	4	1	13½	2	4	0
4	30	1	6	7¼	9	1	6	10½	4	2	2	13¾	2	3	6
												14	2	2	1

USE OF THE TABLE.

At the top of the table, marked inches, fathoms, feet, inches, the first column is the thickness of the rope in inches and quarters, and the other three, the fathoms, feet and inches, that make up a hundred weight of such a rope. One example will make it plain:

Suppose you desire to know how much of a seven-inch rope will make a hundred weight; find 7 in the third column under inches, or thickness of rope, and against it in the fourth column you find 9, 5, 6, which shews that there will be 9 fathoms, 5 feet, 6 inches required to make up one hundred weight.

A TABLE, *shewing the weight of any Cable or Rope of* 120 *fathoms in length, and for every half inch, from* 3 *to* 24 *inches in circumference.*

Inches.	Cwt. Qrs.	Inches.	Cwt. Qrs.	Inches.	Cwt. Qrs.	Inches.	Cwt. Qrs.	Inches.	Cwt. Qrs.
3	2 1	7	12 1	11	30 1	15½	60 0	20	100 0
3½	3 0	7½	14 0	11½	33 0	16	64 0	20½	105 0
4	4 0	8	16 0	12	36 0	16½	68 0	21	110 1
4½	5 0	8½	18 0	12½	39 0	17	72 1	21½	115 2
5	6 1	9	20 1	13	42 1	17½	76 2	22	121 0
5½	7 2	9½	22 2	13½	45 2	18	81 0	22½	126 2
6	9 0	10	25 0	14	49 0	18½	85 2	23	132 1
6½	10 2	10½	27 2	14½	52 2	19	90 1	23½	138 0
				15	56 1	19½	95 0	24	144 0

USE OF THE TABLE.

The first column, marked for inches, is the thickness or circumference of the cable to every half inch from 3 to 24 inches; the second is marked cwt.qrs. for the hundred weights and quarters that it will weigh if 120 fathoms in length.

For instance: Suppose it be a cable of 14½ inches; look against 14½ and you will find in the other column 52 cwt. 2 qrs. which shews that 120 fathoms of 14½ inch cable will weigh 52 cwt. 2 qrs. and so in others; and any a quantity of a less length will weigh in proportion.

A ship was brought to anchor in a gale of wind; but the gale increasing, it was thought safest to cut the cables, in consequence of which 75 fathoms of 16 inches, and 50 fathoms of 12 inches were lost; what must they be valued at in calculating the average, new cordage being then 14 dollars per cwt.?

CALCULATION.

120 fath. 16 in. cable=64 cwt.		120 fath. 12 in. cab.=36 cwt.	
60 do.	32	40 do.	12
15 do.	8	10 do.	3
75 fath. weighing	40	50 fath. weighing	15
50 do.	15		
			dols. cts.
	55 cwt. at 14 dols. per cwt.		770 00
	One third deducted for new		256 66⅔
		Ans.	$513 33⅓

A TABLE, *shewing the weight of Iron Cables of 90 fathoms, and also the comparative strength of Iron and Hemp Cables.*

Iron.			Hemp.		Cwt.
At $1\frac{3}{4}$	inch	- - -	=17	inches, and weighs	123
$1\frac{5}{8}$	"	- - -	16	" - -	107
$1\frac{1}{2}$	"	- - -	15	" - -	92
$1\frac{3}{8}$	"	- - -	14	" - -	78
$1\frac{1}{4}$	"	- - -	13	" - -	65
$1\frac{1}{8}$	"	- - -	12	" - -	52
1	"	- - -	$10\frac{1}{2}$	" - -	42
$\frac{7}{8}$	"	- - -	9	" - -	33
$\frac{3}{4}$	"	- - -	8	" - -	24
$\frac{5}{8}$	"	- - -	7	" - -	17
$\frac{9}{16}$	"	- - -	$6\frac{1}{2}$	" - -	14
$\frac{1}{2}$	"	- - -	6	" - -	12

TABLE, *shewing the number of miles contained in a Degree of Longitude, in each Parallel of Latitude, from the Equator to the Poles.*

Degrees of Latitude.	Miles.	100th parts of a mile.	Degrees of Latitude.	Miles.	100th parts of a mile.	Degrees of Latitude.	Miles.	100th parts of a mile.	Degrees of Latitude.	Miles.	100th parts of a mile.
1	59	96	24	54	81	47	41	00	70	20	52
2	59	94	25	54	38	48	40	15	71	19	54
3	59	92	26	54	00	49	39	36	72	18	55
4	59	86	27	53	44	50	38	57	73	17	54
5	59	77	28	53	00	51	37	73	74	16	53
6	59	67	29	52	48	52	37	00	75	15	52
7	59	56	30	51	96	53	36	18	76	14	51
8	59	40	31	51	43	54	35	26	77	13	50
9	59	20	32	50	88	55	34	41	78	12	48
10	59	08	33	50	32	56	33	55	79	11	45
11	58	89	34	49	74	57	32	67	80	10	42
12	58	68	35	49	15	58	31	70	81	09	38
13	58	46	36	48	54	59	30	90	82	08	35
14	58	22	37	47	92	60	30	00	83	07	32
15	58	00	38	47	26	61	29	04	84	06	28
16	57	60	39	46	62	62	28	17	85	05	23
17	57	30	40	46	00	63	27	24	86	04	18
18	57	04	41	45	28	64	26	30	87	03	14
19	56	73	42	44	95	65	25	36	88	02	09
20	56	38	43	43	88	66	24	41	89	01	05
21	56	00	44	43	16	67	23	45	90	00	00
22	55	63	45	42	43	68	22	48			
23	55	23	46	41	68	69	21	51			

USE OF THE TABLE.

1. How many miles are the inhabitants of Quito, near the equator, and those of St. Petersburg, in lat. 60° N. carried round by the diurnal motion of the earth.

360°	360
In Quito 1°= 60 miles.	In St. Petersburg 1°= 30 miles.
⅙)21600 G. miles.	⅙)10800 G. ms.
3600	1800
Ans. 25200 S. miles.	Ans. 12600 S. ms.

2. What is the distance from Charleston light-house, in long. 80° W. to Bermudas, in long. 64° W. and both in lat. 32° North.

80°—64°=16° diff. long.
1° in lat. 32° is 51 miles.

16°×51=816 G. miles.

In like manner may the distance be found between the following places.

From Cape May,	lon. 75 W.	to Fayal,	long. 29 W.	both in lat.	38° N.
Boston	71	C. Finisterre	9		42
New York	74	Oporto	8		41
Portland	70	Bilboa	3		43
New Haven	73	Rome	12 E.		41
Baltimore	77	Smyrna	27		39

If two places be in the same longitude, the difference of their latitudes is the distance between them.

Required the distance between the city of Washington in lat. 38° N. and Lima in lat. 12 S. both in long. 77 W.

38°+12°=50°×60=3000, the distance in G. miles.

How many miles is the Cape of Good Hope South and East of Philadelphia?

Cape of G. Hope lat.	34° S.	34°	long.	18°	23′ E.
Philadelphia	40 N.	40		75	16 W.
Diff. of latitude	74	2)74	diff. long.	93	89
	60	—		60	
		37			
	4440 miles.	—		5619	miles.

In the middle latitude 37°, a degree is 48 miles, then 60 : 48 : : 5619 : 4495 miles. Or, $98\frac{1}{2}° \times 48 = 4485$ G. miles. Ans. 4440 G. miles, S. and 4495 G. miles E.

The square root of the sum of the squares of the difference of latitude and departure will give the *distance* between them.

The ship Columbus was spoken in lat. 37° 57′ N. and long. 67° 38′ W. bound to a port in lat. 42° 17′ N. and long. 72° 38′ W. What is the distance to the port? Ans. 347.

To find the *bearing* of one place from another by Arithmetic.

Rule. To the distance, as found in the last case, add half the greater of the other two numbers, whether it be latitude or departure, and say,—As the sum is to the less number, so is 86 to the degrees, or angle required, if the difference of latitude be more than the departure. But if the departure be greater, the fourth number, found as above, must be taken from 90° for the answer.

Example.

The city of A is north and West of the town of B. The difference of latitude between them is 260 miles, the departure 230 and the distance 347 miles. Required the bearing of A from B.

347
130

477 : 230 : : 86°
86

1380
1840

477)19780(41°
1908

700
477

223
60

477)13380(28′
954

3840
3816

Taking $\frac{1}{10}$ or $\frac{1}{100}$ of large numbers, will be sufficiently exact for geographical purposes; thus,

34
13

47 : 23 : : 86
23

258
172

47)1978(42° Answering
188 nearly to N.W. $\frac{1}{4}$
N. or N.W. by
98 N. $\frac{3}{4}$ W.
94

If the bearing of B from A was required, it would be 90—42°=48°, or S.E. $\frac{1}{4}$ East.

Suppose the difference of latitude between two places is 197 miles; the difference of longitude, reduced to departure, is 955 miles, and the distance deduced thence 2189: Required the bearing?

21
9

30 : 9 : : 86
9

30)774

Ans. 26° nearly.

Supposing 1970 miles to be departure, the answer would be 90°—26°=64°.

In the former case . . 26°
In the latter 64

Given distance.	Diff. latitude.	Departure.	Bearing.
102	82	60	Ans. 36°
153	146	46	17
186	165	85	27
102	60	82	54
153	46	146	73
135	112	74	33

When the difference of latitude and departure are alike, or nearly so, the answer is 45°, and needs no calculation to find it; as in the example from Philadelphia to the Cape of Good Hope, which in that case is 45°, or South-East, as the Cape is South and East of that city.

When there is little or no departure the bearing is *North* or *South*, and when it is so with the latitude, the bearing is *East* or *West*.

A TABLE OF ANGLES, *which every Point and Quarter Point of the Compass makes with the Meridian.*

NORTH.		*POINTS.*	° ′	*SOUTH.*	
		0...¼	2 . 49		
		0...½	5 . 37		
		0...¾	8 . 26		
N.b.E.	N.bW.	1	11 . 15	S.b.E.	S.b.W.
		1...¼	14 . 04		
		1...½	16 . 52		
		1...¾	19 . 41		
N.N.E.	N.N.W.	2	22 . 30	S.S.E.	S.S.W.
		2...¼	25 . 19		
		2...½	28 . 07		
		2...¾	30 . 56		
N.E.b.N.	N.W.b.N.	3	33 . 45	S.E.b.S.	S.W.b.S.
		3...¼	36 . 34		
		3...½	39 . 22		
		3...¾	42 . 11		
N.E.	N.W.	4	45 . 00	S.E.	S.W.
		4...¼	47 . 49		
		4...½	50 . 37		
		4...¾	53 . 26		
N.E.b.E.	N.W.b.W.	5	56 . 15	S.E.b.E.	S.W.b.W.
		5...¼	59 . 04		
		5...½	61 . 52		
		5...¾	64 . 41		
E.N.E.	W.N.W.	6	67 . 30	E.S.E.	W.S.W.
		6...¼	70 . 19		
		6...½	73 . 07		
		6...¾	75 . 56		
E.b.N.	W.b.N.	7	78 . 45	E.b.S.	W.b.S.
		7...¼	81 . 34		
		7...½	84 . 22		
		7...¾	87 . 11		
East	West	8	90 00	East	West.

To reduce degrees of longitude into time.

RULE. Multiply the degrees by 4 for minutes of time, and the minutes or miles of longitude by 4 for seconds, and divide the products by 60 for time.

EXAMPLE.

Required the time answering to 42° 43′ 45″ of longitude.

	hrs.	ms.	sec.
42°×4=168÷60=	2	48	0
43′×4=172÷60=	0	2	52
45″×4=180÷60=	0	0	3
Ans.	2	50	55

To reduce time into degrees of longitude.

RULE. Multiply the hours by 15 for degrees, and divide the minutes and seconds respectively by 4.

EXAMPLE.

1. Reduce 8 hrs. 37 ms. 38 sec. to degrees of longitude.

8×15=	120°	0′	0″
37÷ 4=	9	15	0
38÷ 4=	0	9	30
Ans.	129	24	30

2. What is the difference of longitude and time between Philadelphia, in longitude 75° 19′ W. and Alexandria in Egypt in 30° 16′ East?

Philadelphia	75°	19′	W.
Alexandria	30	16	E.
difference long.	105	35	

	ms.	sec.
105°×4=	420	0
35′×4=	2	20
60)422	20	

105° 35′= hrs. 7 2 20

Hence, when it is noon at Philadelphia, it is 7 hrs. 2 ms. 20 sec. in the afternoon at Alexandria, and when it is noon at Alexandria, it is only 4 hrs. 57 ms. 40 sec. in the morning at Philadelphia—thus

12	0	0
7	2	20
hrs. 4	57	40

NOTE. When the place required is *east* of the one given, the *time* required will be as much *later* in the day, as the difference of longitude, reduced to time, gives hours and minutes; and when *west* of the given place, it will be so much *earlier*.

When it is 20 minutes past 2 o'clock in the afternoon at Marseilles, in longitude 5° 22′ E. what time is it at Boston light-house, in longitude 70° 58′ W.

Ans. 9 hrs. 14 ms. 40 sec. in the morning.

To find the part of the Globe opposite to a given place.

Rule. Take the same latitude of an opposite name for the place required, and subtract the longitude of the given place from 180°, the remainder is the longitude of the place required, but of an opposite name.

Examples.

1. Required the opposite part of the globe to London in latitude 51° 31′ N. and near the first meridian.

London	lat.	51°	31′ N. long.	0° 00′
Opposite place		51	31 S.	180 00

2. Required the opposite part of the globe to Boston.

Boston	lat.	42°	23′ N. long.	71° 03′ W.
Opposite place		42	23 S. long.	108 57 E.

3. Suppose a ship in any of the following places, what place on the globe would be opposite to it?

In lat			long.			Ans. Salem in	long.		
42°	34′	S.	109°	05′	E.		70°	55′	W.
38	53		102	41		City of Washington	77	19	
40	28		105	48		New York	74	12	
39	57		104	41		Philadelphia	75	19	
32	44		99	53		Charleston, S. C.	80	07	
39	20		103	05		Baltimore	76	55	
43	39		109	47		Portland	70	13	
41	18		106	58		New Haven	73	02	

To estimate the distance of objects at sea.

Multiply the square root of the height in feet by $1\frac{1}{2}$, and point off the units' figure in the product for decimal parts, the remainder is the miles required—thus,

Height.	*Sq. Root.*	*Miles.*
At 16 feet	4 × $1\frac{1}{2}$	= 4,6 the distance.
25	5	" = 5,7
36	6	" = 6,9
49	7	" = 8,0
81	9	" = 10,3
144	12	" = 13,8
900	30	" = 34,5
2500	50	" = 57,5
3600	60	" = 69,0
5285	72,7	" = 83,6

PLANETARY MOTION.

To find the velocity of a Planet's motion in its orbit.

RULE. As 1 is to 3,14159, so is the diameter of the Planet's orbit to its circumference, and as the time of revolving is to the circumference, so is the given time to the distance required.

EXAMPLE.

If the Earth moves round the Sun in a year at the distance of 95 millions of miles; What is the hourly velocity of its motion?

95
2

1 : 3,14+ : : 190,000,000
3,14+

365)596,000,000 Circumference.

24)1,634,520

Ans. 68,105 miles per hour.

The distances of the other planets from the sun, and the times of their revolving round it being known, the daily and hourly velocity of their motion in their orbits may be found as in the preceding example.

	Mean distances.	Time of revolving.
Mercury	37 millions	88 days.
Venus	68	224
Mars	144	687
Jupiter	490	4332
Saturn	900	10759
Herschel	1800	30737

MISCELLANEOUS QUESTIONS.

PART I.

1. If Gunter's chain of 100 links be equal to 4 rods or perches, what is the length of 1 link, and how many square links in an acre?

4 Rods=66 feet.
12

100)792

7,92 in. to a link.
7,92

Ins. 62,7264=1 sq. link.
1 Acre = 43560 sq. ft.
144 inches.

62,7264)6272640

Ans. 100000 links.

2. In 23 chains 48 links, how many rods, &c.?

23,48
4

93,92
16½

1472
46

15,18
12

$2,\frac{16}{100}=\frac{4}{25}$

Ans. 93 rds. 15 ft. $2\frac{4}{25}$ ins.

3. How many chains in a mile?

1 mile = 1760 yds.

1 Chain = 22 = 80 Chains.

4. In 534 chains, 72 links, how many miles?

80)534,72

6,684
1760

1203,840

Ans. 6 miles 1203¾ yds.

5. If the tunnel of a canal at the base be 18 feet and the height 12 feet, how many cubic yards in every running yard?

18×12×3=648

3×3×3= 27 =24 yds.

6. How many cubic feet of water in a pond, containing 95 acres, 20 feet deep?

1 acre = 43560 ft. × 95 = 4138200
20

Ans. 82,764,000 Cubic feet.

7. What quantity of water may be retained in the following ponds, if used as reservoirs for a canal?

				Cubic feet.
U	286 acres	20 feet deep	=	249,163,200
L	208	10	=	90,604,800
E	66	10	=	28,749,600
W	27	10	=	11,761,200
G	139	20	=	121,096,800
W	152	20	=	132,422,400
	Whole 878		Cubic feet	633,798,000

8. Suppose a loss of 1 foot by evaporation from the surfaces of these 6 ponds, how many feet in the whole?
1 acre = 43560 feet × 878 acres = 38,245,680 Cubic feet.

9.	57 yards	at 79¾ cts.	$ 45,45¾
	79½	57	
	87¾	49	
	115¾	$1,11	
	2764	32½	
	7496	27⅜	
	4672	15 5/10	
	1952	9⅛	
		Ans.	$4105,49¾ cts.

10. Three pieces of land, measuring, viz.

				cwt. qrs. lbs.	
1 piece	253 ft. by	24 ft.	produced	10 3 0	of hay.
2 "	252	19½	"	9 0 0	
3 "	252	20½	"	11 0 0	

What was the produce of each equal to per acre?

			tons.		
Ans.	1 piece	equal to	3 17 0	13	per acre.
	2 "	"	3 19 3	3	
	3 "	"	4 12 3	0	

11. The births in a certain town were 475, and the proportion 13 boys to 12 girls. What is the number of each?
Ans. 247 boys, and 228 girls.

12. How many yards of carpet, yard wide, will cover a floor 25 feet long, and 18 wide? Ans. 50 yards.

13. How many trees 4 feet apart every way, may grow in a nursery of one acre of ground? Ans. 2722 trees.

14. If a ship of 350 tons, chartered at 3*s.* per ton per month, deliver a cargo of 600 tons, what is the real rate per ton? Ans. 1*s.* 9*d.*

15. A farmer raised 43 tons 11 cwt. 3 qrs. 14 lb. of carrots on 1 acre 1 rood and 25 perches. What was it per acre? Ans. 31 tons.

16.

$411\frac{1}{4}$ yds.	at 14	$7\frac{1}{3}$ per yard	Ans. to each
$246\frac{3}{4}$	24	$4\frac{1}{2}$	
$822\frac{1}{2}$	7	$3\frac{3}{4}$	
$164\frac{1}{2}$	36	$6\frac{3}{4}$	£300 14 $6\frac{1}{4}$
$493\frac{1}{2}$	12	$2\frac{1}{4}$	
$2467\frac{1}{2}$	2	$5\frac{1}{4}$	
$215\frac{4}{5}\frac{2}{5}$	27	$10\frac{3}{7}$	

17. There are two numbers in proportion as $\frac{3}{5}$ to 11, the greater is 3267, what is the sum of both? Ans. 4158.

18. The Chinese wall is said to be 1200 miles in length, averaging 18 feet high, and as many thick, how many solid fathoms does it contain? Ans. 9,504,000 fathoms.

19. Suppose a steam-boat at $\$110\frac{3}{4}$ per share cost $25472, 50 cts. and that $\frac{62}{365}$ of it sold for $5725. Was there a gain or loss by the sale? Ans. $1141,50 loss.

20. A pile of wood 84 feet 6 inches long, 22 feet 7 inches high, and 23 feet 10 inches wide, is sold at $3,26 per cord, what is the amount? Ans. $1158,32 cts.

21. Required the cost of a lot of land 62 feet $11\frac{3}{4}$ inches long and 27 feet $3\frac{1}{2}$ inches wide, at $1,80 per square foot? Ans. $3093,86 cts.

22. A. of Providence has in his hands $500 due to G. o Charleston, for net proceeds of his cotton, this is remitted to G. per bill on M. in his favour when bills on Charleston are at 2 per cent. discount. Required the amount of the bill Ans. 510,20.

23. Suppose $\$984,37\frac{1}{2}$ was paid in New-Orleans for a bill on New-York, when the advance was 5 per cent. what was the bill drawn for? Ans. $937,50.

24. If 33865 feet of land sold in Boston in 1824 for $403, 840,12$\frac{1}{2}$ cts. how much is it per foot, and what would be the rate per acre in Federal and also in Sterling money?
Ans. $\$11,92\frac{1}{2}$ per foot,
$519,453 per acre,
Equal to £116,876 18 6 ster.

25. Bo't 40 bbls. No. 3 Mackerel at $2,53¾ at 3 months credit.

40	"	"	2	ditto . .	4,56¾	4	" "
20	"	"	1	ditto . .	6,88½	6	" "
20	"	Mess	Beef	. .	9,78½	8	" "
15	"	Salmon		. . .	10,66	10	" "

Required the equated time of payment, and what sum would discharge it, allowing the interest for the time as discount.

Ans. 6 months, 14 days, and $752,38.

26. A canal loan of $300,000 was taken on the following terms, viz.

25,000	. . . at	$102,12½	per cent $
25,000	. . . . .	101,50	" "
25,000	. . . . .	101,01½	" "
10,000	. . . . .	100,80	" "
15,000	. . . . .	100,70	" "
25,000	. . . . .	100,52	" "
30,000	. . . . .	100,31	" "
145,000	. . . . .	100,12	" "
300,000			

Required the average per cent. and bonus or Gain to the Canal.

Ans. $100,58$\frac{1}{17}$ per cent.
Bonus or gain $1742.

27. By Ferguson's tables of specific gravities a cubic inch of pump water weighs 9,26 drams, and it is found on trial that a gallon of 231 cubic inches of cider weighs 10 oz. 10 drams more than water. What then should the liquor in a barrel of 31½ gallons weigh? Ans. 284 lbs.

If the gallon be taken for 9 lbs. it will answer for common purposes.

28. B and C purchased 1200 acres of land at one dollar per acre, each paying $600. Some time after, C on viewing it, offers to take a certain square piece at $1,75 per acre to the amount of his advance, to which B consents. How many acres will each have, What is the length of each side of C's lot, and what does B's part cost him per acre?

Ans. C has 342 acres 3 roods 17$\frac{1}{7}$ poles.
B 857 " 0 " 22$\frac{2}{7}$ "
B's land is 70 cts. per acre.
Side of C's = 234 rods 3 ft. 6$\frac{3}{4}$ inches.

29. Three parcels of beef, of 60 barrels each, were received at Baltimore from Boston, marked, viz. W. X. Y. The lot marked W was found to be 50 per cent. better than the others. If the whole sold together at $10 per barrel, how must the sales be adjusted between the owners of the beef?

Ans. Y's parcel 60 bbls. at $8,57$\frac{1}{7}$. $514,28$\frac{4}{7}$
X . . 60 " 8,57$\frac{1}{7}$. 514,28$\frac{4}{7}$
W . . 60 " 12,85$\frac{5}{7}$. 771,42$\frac{4}{7}$
180 " $10,00 $1800,00

30. The length of a room is 25 feet, the height 10$\frac{1}{2}$, and the width 12$\frac{1}{2}$ feet; what is the weight of the air this room contains, and also of the water it would contain, supposing a cubic foot of water to weigh 1000 ounces, and air to be 800 times lighter than water?

Ans. 256 lbs. 5 oz. of Air.
205062 lbs. 8 oz. of Water.

31. If iron worth, in cash, $4 per cwt. is sold for $4,50 on a credit of 8 months, what credit should be allowed on selling wine, worth in cash $224 per pipe, but charged at $242, to make the per-centage equal to that on the iron?

Ans. 5$\frac{1}{7}$ months.

32. A bought a lot of flour for cash, and sold it to B at an advance. B sold it to C at 10 per cent. advance, and C on selling it to D gained $71,28 equal to 12 per cent. profit; which was 4 per cent. more than A made, though he bought it at $5 per barrel. Required B's gain, how much C received, and the number of barrels in the lot.

Ans. B gained $54,00.
C received 665,28.
In the lot, 100 bbls.

33. What would be the duty on a piece of flannel 30 yards long and 42 inches wide, if it was estimated at 40 cents per square yard, and 30 per cent. ad valorem, and what per centage would it pay on the original cost, if charged at 15*d.* sterling per yard? Ans. $4,20 duty, and 50 per cent.

34. Suppose a piece of baize 46 yards long, and 26 inches wide, estimated at 40 cts. per square yard, and 30 per cent. ad valorem, what would be the duty, and what per centage would it pay on the original cost, if charged at 27*s.* sterling?

Ans. $3,96 duty, and 66 per cent.

35. From four persons who failed in trade and compounded with their creditors; G, as creditor to each, received, viz.

From A, who paid $4\frac{3}{5}\frac{3}{7}\frac{1}{2}\frac{1}{0}\frac{1}{1}$ shil. per £, he rec'd £117 15 2
B . . . $7\frac{2}{5}\frac{3}{7}\frac{4}{2}\frac{4}{0}\frac{3}{1}$ " 176 12 9
C . . . $9\frac{5}{5}\frac{4}{7}\frac{4}{2}\frac{2}{0}\frac{1}{1}$ " 235 10 4
D . . . $14s.\ 9\frac{3}{5}d.\frac{9}{1}\frac{1}{0}\frac{2}{0}\frac{3}{1}$ 353 5 6

What was the sum of *each* debt thus discharged.

Ans. £476 13 6.

36. The following lots of Sugar, received per Paragon from Havana, were sold in Boston on account of sundry persons in Cuba, at $12\frac{3}{4}$ cts. per lb. Required the amount of each, allowing for draft 4 lbs. per box, and for tare 15 per cent.

A's part	21 boxes	w'g. 10794 lbs. gross,	$1126,56
B . .	70 . . .	35980	3755,19
C . .	84 . . .	43176	4506,23
D . .	105 . . .	53970	5632,85
E . .	119 . . .	61166	6383,82
F . .	133 . . .	68362	7134,93
G . .	147 . . .	75558	7885,90
H . .	126 . . .	64764	6759,34
I . .	154 , . .	79156	8261,42
K . .	168 . . .	86352	9012,46

37. A's commission at 5 per ct. on a consignment of Coffee was $47,50, by the gross sales of which the shipper made 25 per cent. profit. What was it invoiced at? Ans. $760.

38. A merchant on selling certain goods on commission, charges $2\frac{1}{2}$ per cent. and $\frac{1}{4}$ per cent. for prompt payment of the net proceeds. Suppose the latter amounts to $3,00,3 mills, what was the commission? Ans. $30,80 cts.

39. How much money at interest at 6 per cent. per annum from February 16th, 1825, would be sufficient to meet a Custom-house bond of $1464,45 which becomes due on 10th January, 1826. Ans. $1389,52$\frac{3}{4}$ cts.

40. A merchant received on consignment three parcels of hops, viz. 450 lbs. belonging to A, 890 to B, and 510 to C. A's hops were found on inspection to be $33\frac{1}{3}$ per cent. better than the others, but it was found necessary to sell them

together at 12 cts. per lb. How much do their respective sales amount to?

				cts. m.	
Ans.	C's	510 lbs.	at	11,1	$56,61
	B's	890 . .		11,1	98,79
	A's	450 . .		14,8	66,60
		1850 at		12 cts. =	$222,00

41. H of Baltimore remits to C in Boston for sale a set of Exchange on London, the proceeds of which to be invested in certain merchandise for his account. On selling the bill at 10 per cent. advance, C received $8600. How much was the bill drawn for, and how much is B to lay out for H, so as to reserve for himself $\frac{1}{2}$ per cent. on sale of the bill, and $2\frac{1}{2}$ per cent. commission on the investment?

Ans. the bill was £1759 1 $9\frac{6}{11}$.
for investment $8348,29$\frac{1}{2}$.

42. A pedestrian for a wager of $1000, having engaged to travel 17 miles in 1 hour $34\frac{1}{2}$ minutes, finished 10 miles of it in 1 hour $0\frac{1}{2}$ minute, and performed the task in 1 hour 31 minutes. It is required to know whether he was before or after time when he had travelled the 10 miles, and how much was he before time when he finished.

Ans. he was 1555 yards after time at the end of 10 miles,
and 1108 " before time when he finished.

43. Suppose the town of B to be due east of the town of A, and the town of C due south of it at an equal distance. If the distance in a straight line from B to C is 196 miles, what is the distance from B to A? Ans. 138+ miles.

44. G owns $\frac{3}{4}$ of $\frac{1}{2}$, and $\frac{3}{7}$ of $\frac{6}{11}$ of the other $\frac{1}{2}$, of an undivided estate in ——. Suppose this estate rents for $1556,94 cts. being equal to 6 per cent. per annum on its value, and that he sells $\frac{1}{2}$ of his part on such terms as to yield the purchaser 8 per cent. per annum on his payment, How much does G receive, and what share has he now in the estate?

Ans. he received $2148,37$\frac{1}{2}$, and he owns $\frac{17}{154}$ths of it.

45. A merchant tailor bought 40 yards of Cloth, $2\frac{1}{4}$ yards wide, but being made wet, it shrunk in length upon every 4 yards, half a quarter, and in width one nail and a half upon every $1\frac{1}{2}$ yard. To line this cloth, he bought baize 5 qrs. wide, which being wet, did shrink the whole width on every 20 yards in length, and in width it shrunk half a nail.

Required the number of yards of baize used in lining the cloth? Ans. $71\frac{7}{13}$ yards.

46. Two persons brought each to market 15 bushels of Long Island pippins. B sent his by one of the line of packets to England, for the proceeds of which the Captain at his return paid him, exclusive of freight and commission, 30 British sovereigns of £1 sterling each. C sold his at 1 cent for the first bushel and the price to be doubled to the last. Required the proceeds of each.

Ans. 15 bushels at 1 cent, &c. $327,67.
30 sovereigns à $4,44\frac{4}{9}$ $133,33\frac{1}{3}$.

47. The circumference of the great bell of Moscow is 67 feet 4 inches, required the area of the ground it covers, where it lodges, and the side of a square equal to the area.

Ans. 361 feet.
Side of the square = 19 feet.

48. A person being asked in the afternoon what o'clock it was, answered, that the time past from noon was equal to $\frac{1}{4}$ of the time to midnight. Required the exact time.

Ans. 5 hours 20 minutes.

Suppose the time was $\frac{1}{3}$ to midnight, Required the hour and minute. Ans. 4 hours $17\frac{1}{7}$ minutes.

49. A on preparing for a voyage to Calcutta purchased of G specie dollars to be paid for in 18 months with interest. Supposing the premium on the dollars to be 3 per cent. and that G would have a compensation of 5 per cent. per annum for the use of his money, to be inserted in the note, which was given for $22145. I would know the sum purchased.

Ans. $20000.

50. Two merchants, B and C trade together, B advances $5000, and at the end of 4 months, being pressed for money to answer a demand, he takes out a certain sum, leaving the remainder to continue 8 months. C advances $2500, and at the end of 5 months he finds it necessary to put in $3000 more, and continues the whole 7 months longer, when they close their business, and B finds he has gained $1066\frac{2}{3}$, and C $1333\frac{1}{3}$. I would know how much B took out at the end of 4 months? Ans. $2400.

51. At what price per quintal should fish be rated which is now worth in Boston 15*s*. per quintal, that on selling it at 9 months credit, there may be 15 per cent. gain, after allowing 5 per cent. discount for present payment?

Ans. 18*s*. $11\frac{11}{19}\frac{11}{0}$.

EXCHANGE.

EXCHANGE is the paying of money in one place or country, for the like value to be received in another place or country.

There are two kinds of money, viz. real, and imaginary.

Real money is a piece of metal coined by the authority of the state, and current at a certain price, by virtue of the said authority, or of its own intrinsic value.

Imaginary money is a denomination used to express a sum of money of which there is no real species, as a *livre* in France, a *pound* in America, because there is no specie current, in this or that country, precisely the value of either of the sums.

Par of Exchange is the intrinsic value of the money of one country compared with that of another country, as one pound sterling is equal to $4,44\frac{4}{9}$ cents; and a bill of £153 sterling at par, would be valued at $680 in the United States.

Course of Exchange is the current or running price of exchange, which is sometimes above, and sometimes below par, varying according to the occurrences of trade, or demand for money. Thus—when the course of exchange is 10 per cent. advance, or in favour of London, the £ sterling is valued at $4,88\frac{8}{9}$ cents, and a bill of £153 is worth $748, but if at 10 per cent. discount, the £ is then equal to $4, and the same bill is worth but $612.

In the latter case, the exchange is in favour of this country, in the former against it.

UNITED STATES.

The money of account is the dollar of 100 cents.

The standard quality of silver, on which the currency is based, is 10 oz. 14 dwts. $4\frac{5}{13}$ grs. fine in 12 ounces. An ounce of which is worth $115\frac{5}{13}$ cents. The weight of the Dollar is 17 dwts. 8 grs. equal to 416 grs.

An ounce of standard gold is worth $17,71 cts. or 27 grs. for a dollar.

When gold or silver is below standard, the expense of refining is from five to six cents per ounce. If silver is above standard, the alloy is paid for. The value of the precious metals can be ascertained and established in all cases, only by the Assayer of the Mint.

"In regulating the value of our own and foreign coins, our laws have fixed the value of one ounce of gold at fifteen of silver. But throughout commercial Europe, gold is valued both in commerce and by law, at a higher comparative

value. In this country it is worth more than the legal rate, or, in other words, it is sold at a premium. Thence it appears, that while the gold in which a bill of £100 sterling is payable in London at $4,44\frac{4}{9}$, the commercial par, it is intrinsically worth much more; and therefore, while a bill, bought here in dollars, might bring exactly the same amount in London, a bill payable in the gold coin of England, or in paper at par with gold, might be from five to ten per cent. above par."

GREAT BRITAIN.

The money of account is in Pounds, Shillings, Pence and Farthings. The principal coins are the guinea and its parts, and the crown and its parts.

The Pound Sterling or Sovereign is to the United States Dollar of 4*s.* 6*d.* sterling as . . . . . 9 to 40
The Guinea of 21 shillings . . . . . 1 to 4⅔
The Crown of 5 " . . . . . 9 to 10
The Shilling . . . . . 9 to 2
Pence to Cents . . . . . 27 to 50

	N. E. & V.	N. Y. & N. C.	P. N. J. D. & Md.	S. C. & G.	Canada & N. S.	Newfoundland.	Fed. Money.
£9 sterling =	£12	16	15	9½	10	9	$40

COINAGE OF 1817.

			oz.	dwt.	grs.
Gold Coins.	Half Sovereign of 10 shillings weighing		0	2	13,6+
	Sovereign 20 " or £1		0	5	3,2+
	Double Sovereign 40 "	£2	0	10	6,5
	5 Sovereign piece of 100 "	£5	1	5	16,3+

An ounce of Standard Gold, on which the currency is based, is worth £3 17 10½
An ounce of Standard Silver is worth 0 5 2
A *Plum* in British money is . . . . . £100,000.

British Stocks, or Public Funds. Feb. 16.

The prices of British Stocks, &c. are stated in the lists that are daily published, as follows:

1. Bank Stock . . .	226		
2. 3 per cent. Consols . .	63¼ . .	64¼	⅛
3. Bank Long Annuities . .	16⅛ . .	1——16	
4. Exchequer Bills . .	2 . .	3	
5. India Bonds . . .	1 pr.	2 disct.	
6. Omnium	3¾ premium.		
7. Consols for Feb. 25 . .	62½		

1 Signifies that £226 is given on that day for £100 Bank Stock.

2 Signifies that the value of £100 of this kind of Stock sold on the day this price was quoted for £63 5*s.* at the beginning of the market and that it rose to £64 15, and left off at £64 10.

3 Signifies that the annual payment of these annuities was worth 16⅞ years' purchase at the beginning, and left off at $16\frac{1}{16}$ years' purchase, at the close of the market.

4 Signifies that every £100 in Exchequer Bills bore a premium of 2 shillings, at the beginning, which advanced to 3 shillings at the end of the day.

5 Signifies that every £100 of India Bonds sold at first at one shilling premium, and afterwards sold at two shillings discount.

6 Signifies that Omnium sold for a premium of £3 15.

Consols are produced by above 400 millions of stock, in part formed by the consolidation of several stocks, bearing an interest of 3 per cent. When the word Consols is indefinitely used, it is always understood to mean these annuities. The 4 per cents. are formed by a similar consolidation of 50 millions of government stocks. The reason, that the 3 per cents. reduced, when mentioned, are quoted higher than the 3 per cents. Consols is, that there is more interest due on the former, than on the latter; that is, the half year's interest on the reduced, is due on Lady Day, or 25th of March, but on the Consols, not till Midsummer.

Omnium is a term denoting the different stocks formed by a loan, while any part of the loan remains unpaid. For example, suppose 50 millions of money are to be raised, and for every £100 in money are to be given £100 stock in 3 per cents. £50 stock in the 4 per cents. and 6*s*. 3*d*. per cent. in the long annuities, payable in 1860, then if any person engage to advance £10,000 in money; upon paying the first instalment, (for the money is usually advanced at the rate of 10 per cent. per month, until the whole is paid) he will receive three receipts, which separately contain an engagement to transfer to the person possessing them £10,000 stock in the 3 per cents. £5000 stock in the 4 per cents. and £31 10 stock in the long annuities, &c. upon the whole of the instalments being paid at or before the appointed time. While these three receipts are sold together, and before the whole of the instalments has been paid, they are called Omnium, as they are made up of all, or several of the stocks.

Scrip is a term given to each of the Omnium, when sold separately.

When the stock created by any loan is formed, in only one sort of stock, there is properly speaking no *omnium*, though then by a misnomer, the scrip receipt is called by that name.

7 Shows that some persons had bought stock in anticipation, and agreed to give for it on the day mentioned at the rate of £62 10 per cent.

1. What is the value of a bill of £786 17 6 sterling, at 8 per cent. advance.

	786,875
	40
	9)31475,000
	3497,222
add 8 per cent.	279,778
Ans.	$3777,000

2. Suppose $600 be invested in a bill on London, when the exchange is 10 per cent. advance, what is the amount in sterling.

600
9
40)5400
£135
deduct $\frac{1}{11}$ 12 5 5½
Ans. £122 14 6½

As the Ex. is $\frac{1}{11}$ of 100, deducting $\frac{1}{11}$ from the par value gives the answer.

3. Invest $563,70 in a bill on London, when the exchange is 9 per cent. advance.

109 : 100 : : 563,70 : 517,15

$517,15×9=4654,35

$\frac{4654,35}{40}$ = £116 7 2

£750	14	6	ster. at 5	per cent.	adv.	. .	$3503,38
114	18	5	"	2½	"	"	disct. . . .	497,99
179	0	0	"	9¼	"	"	adv. . . .	864,14
211	15	9	"	10½	"	"	" . . .	1040,11
783	11	11	"	10¾	"	"	" . . .	3857,03

When the British merchant in his interest account allows 3 per cent. for deposits, he rejects $\frac{3}{5}$ths of the products of time and money, and considers the remainder as products at 5 per cent. which is equal to one shilling per £ for 365 days.

EXAMPLE.

1. Suppose the balance of products to be 107408, what is the interest at 3 per cent.

107408
off $\frac{2}{5}$ 42963
365)64445
176*s*, 6$\frac{3}{4}$*d*.
Ans. £8 17 6$\frac{3}{4}$.

2. What is the premium of insuring £20 at 30*s*. per cent.?
Ans. 6 shillings.

Calculations of Actual Sales of British Goods in United States.

		£	s.	d.			$ cts.
1.	Sterling	53	11	6	at	75 per ct. advance	Ans. 416,69
2.		46	12	6	at	33⅓ "	276,29
3.		81	6	8	at	$5 per £ sterling	406,67
4.		73	17	6	at	4¼	360,14
5.		97	18	6	at	4,06	397,57
6.		149	6	8	at	par	663,70
7.		107	6	11	at	17½ per ct. advance	560,58
8.		864	0	0	at	2⅝ " discount	3748,80
9.		281	13	5	at	12½ " "	1095,39
10.		113	12	10	at	18¾ " advance	599,77
11.		158	13	0	at	$4,15 cts. per £ sterling	658,39

A TABLE *for reducing Sterling to Federal Money at par.*

£	$ cts. ms.
1000	4444 44 4
900	4000 00 0
800	3555 55 5
700	3111 11 1
600	2666 66 6
500	2222 22 2
400	1777 77 7
300	1333 33 3
200	888 88 8
100	444 44 4
90	400 00 0
80	355 55 5
70	311 11 1
60	266 66 6
50	222 22 2
40	177 77 7
30	133 33 3
20	88 88 8
10	44 44 4
9	40 00 0
8	35 55 5
7	31 11 1
6	26 66 6
5	22 22 2
4	17 77 7
3	13 33 3
2	8 88 8
1	4 44 4

s.	$ cts. ms.
19	4 22 2
18	4 00 0
17	3 77 7
16	3 55 5
15	3 33 3
14	3 11 1
13	2 88 8
12	2 66 6
11	2 44 4
10	2 22 2
9	2 00 0
8	1 77 7
7	1 55 5
6	1 33 3
5	1 11 1
4	0 88 8
3	0 66 6
2	0 44 4
1	0 22 2

pence.	cts. ms.
11	20 4
10	18 5
9	16 7
8	14 8
7	13 0
6	11 1
5	9 3
4	7 4
3	5 5
2	3 7
1	1 8
¾	1 4
½	0 9½
¼	0 4½

USE OF THE TABLE.

Reduce £987 13 9¾ sterling to Federal Money.

£900 . . .	$4000,00,0
80	355,55,5
7	31,11,1
13*s*.	2,88,8
9*d*. . . .	0,16,7
¾*d*. . .	0, 1,4
	$4389,73,5

Proof.

£987 13 9¾	
	987,691
	40
	9)39507640
	$4389,73,7

A merchant receives from Liverpool a parcel of goods, and marks them for sale at the following rates: Required the selling price in Federal Money?

£.	d.					s.	d.			
13	8	ster. at par			$3,04	11	9	at 33⅓	per ct. adv.	$3,48
5	10	"	10 pr. ct.	adv.	1,42	2	4	40	"	72
3	4	"	12½	"	83	32	3	50	"	10,75
6	1½	"	15	"	1,57	27	9	60	"	9,86
17	0	"	17½	"	4,44	34	11	75	"	13,58
33	1	"	20	"	8,82	12	3	100	"	5,44
1	2	"	25	"	33	55	0	10	disct.	11,00
18	10	"	30	"	5,44	83	3	25	"	13,88

IRELAND.

The money of account as in England, but different in value. The par between England and Ireland, is 8⅓ per cent. that is, £100 sterling money is £108 6 8 in Ireland.

The United States dollar is equal to 4*s.* 10½*d.* Irish.

The English guinea is equal to 22*s.* 9*d.* Irish.

After the 5th of January, 1826, the New Act assimilating the Irish and English currency commenced. All Invoices, Contracts, &c. will be considered there in point of law, British currency, *unless* expressed to the contrary.

HAMBURGH.

Accounts are kept in Hamburgh in Marks, shillings Lubs or Stivers, and Deniers.

12 deniers, or 2 grotes make 1 shilling lubs, or stiver.
16 shillings lubs, stivers, or 32 grotes . . . . } 1 mark.

ALSO,

12 grotes or pence Flemish make 1 shilling Flemish.
20 shillings Flemish . . . 1 pound.

NOTE. 3 marks . . . make 1 rix dollar.
7½ do. . . . . 1 pound Flemish.
A shippound in Hamburgh 280 lb.
A ring of staves do. 240
100 lb. in Hamburgh . . 107¼ in U. States.
100 ells do. . . . . 62½ yards.

The currency of Hamburgh is inferior to the bank money; the *agio*, or rate, is variable; May 14th, 1798, it was 20 per cent. in favour of the bank.

The mark banco is 33⅓ cents; (See laws of the U. States.)

HOLLAND.

Accounts are kept in Florins or Gilders, Stivers, Deniers or Pennings.

8 pennings	make	1 grote.
2 grotes, or 16 pennings . . .		1 stiver.
20 stivers, or 40 grotes		1 gilder or florin.

ALSO,

12 grotes, or 6 stivers	1 shilling.
20 shillings, or 6 gilders . . .	1 pound Flemish.
2½ florins	1 rix dollar.

The florin or gilder of the United Netherlands is estimated in the United States at 40 cents, or 2 cents per stiver.

100 lb. in Amsterdam make 109½ lb. in the U. States.
100 ells do. . . . . 75 yards do.

In liquid measure, 16 mingles make 1 steckan, 8 steckans 1 aum. = 41 gallons.

To change Sterling to Flemish.

Rule. As 1 pound sterling is to the given rate, so is the sterling given to the Flemish required.

To change Flemish to Sterling.

Rule. As the given rate is to £1 sterling, so is the Flemish given to the sterling required.

The Old Bank of Amsterdam having ceased to exist on the first of February, 1820, all payments are now made in *Current Money*, and the *Agio* which formerly existed between Bank and Current was on that day abolished.

A new system of moneys, weights and measures, similar to that of France, has been established for Holland, Brabant and Flanders, in which the Florin is made the monetary unit with decimal divisions.

1. What will 4853 kilo. of sugar come to, at 40½ florins per cent.?

4853
40½

194120
2426½

Ans. fl. 1965,46½ Centimes.

2. What will 4504 lbs. of sugar come to, at 14 grotes per lb. allowing 2 per cent. for draft, and 12 per cent. tare?

	4504
draft 2 per cent.	90
	4414
tare 12 per cent.	530
	3884 Net
	14
	2)54376
	2,0)2768,8

Ans. fl. 1384 8 stivers.

ANTWERP.

Accounts are kept in Antwerp in gilders, shillings, and grotes, or in gilders and centimes.

12 grotes or pence, Fl.* make 1 shilling.
$3\frac{1}{3}$ shillings, or 40 grotes . . 1 gilder.

The Brabant or Antwerp grotes are of the value of the cents of the United States, a gilder being reckoned at 40 cts. In the current money of Antwerp they have stivers of the value of the stiver of Amsterdam, or 2 cts. U. States currency.

The Old conditions of sale, viz. stivers and grotes, are still quoted in Price Currents, but the accounts are stated in Florins and Centimes.

100 pots Brabant	=	$36\frac{1}{2}$ gallons U. States.
96 lb. Antwerp	=	100 lb. do.
100 Brabant ells, about		74 yds. American.

* Pence connected with shillings, Flem. are equal to cents, but connected with stivers are twelfths of a stiver, or $\frac{1}{6}$ of a cent.

EXAMPLE.

In Exchange with London *f.*11 19*st.* 6*d.* or 39*sh.* 11*d.* Flem. per £ are alike: thus,

*f.*11 19 6	*s. d.*
20	39 11
	12
239½ St.	
2	479 pence = cents.
479 grotes.	

The new quintal of Antwerp consists of 10 myriagrammes or 204 lb. 14 oz. Avoirdupois weight.

$107\frac{1}{2}$ lbs. Antwerp . . = 112 lbs. Eng.
$216\frac{11}{16}$ " . . . = 100 Kilograms.

In 5500 Kilos. of coffee, how many Antwerp lbs.?
100 : $212\frac{11}{16}$: : 5500. Ans. 11698 lbs.

In 11698 Antwerp lbs. how many lbs. Eng.?
$107\frac{1}{2}$: 112 : : 11698. Ans. 12188 lb. Eng.

Required the net sales of 1200 bags of coffee, weighing, viz.
kilo. 59466 = 126477 Antwerp pounds.

Off 2 per ct. for good weight	2530
	123947
Tare 2 per ct.	2479
	121468 Nt.
	$6\frac{9}{16}$ stivers per lb.
At 6	728808
$\frac{9}{16}$	$683253\frac{3}{4}$
	20)79713,$3\frac{3}{4}$
fl.	39856,69 centimes.
Discount 2 per ct.	797,13
Ans. fl.	39079,56

The amount of the gross sales of 800 bags of coffee in 1824 was fl. 26210,63.

On $\frac{3}{8}$ of which there was a discount of 2 per ct.
$\frac{5}{8}$ of it $1\frac{1}{2}$
Required the net sales. Ans. fl. 25768,33

An American merchant directs that fl. 26308,2 to his credit at Antwerp be remitted to London. Required the amount to his credit there, the remittance being effected at fl. 12,1 per £ sterl.

12,1 26308 2
20 20

£241 : 1 : : 526162 : Ans. £2183 4 11

What is the interest of fl. 9161 for 43 days at 5 per cent.?

9161
43

27483
36644

6,000)393,923

65,65 at 6 per cent.
Deduct $\frac{1}{6}$ 10,94

Ans. fl. 54,71

The several charges on sale of coffee in 1827, after deducting the discount, amounted to circa $7\frac{3}{4}$ per cent.

EXAMPLE.

Gross sales—say	*f.*3773,00
Discounting $1\frac{1}{2}$ per cent.	56,60
	3716,40
Estimated charges on *f.*3716$\frac{40}{100}$ at $7\frac{3}{4}$ per cent.	288,02
Actual charges on the same in Oct. 1827, viz.	
Landing, &c. Duty, &c. . . . *f.*177,62	
Com. and Guaranty . . . 111,49	
	289,11

In Oct. 1827, sugar, if sold at 18 florins per 50 kilos. would net $6,153 per 100 lb. Eng. exclusive of freight and commission. And to know how much it would net at any other price, multiply the quarter florins of difference from 18 florins, the assumed price, by ,088, and add or subtract, as the case may be, for the answer.

EXAMPLE.

If Havana sugar be quoted and nets as before, how much would it net per 100 lb Eng. exclusive of freight and insurance, if quoted at 24, $26\frac{1}{2}$, or 35 florins?

At 24 fl.	or 24 qrs.	diff.	×,088 = 2,112 + 6,153 =	$ 8,265
$26\frac{1}{2}$	or 34	"	×,088 = 2,992 + 6,153 =	9,145
35	or 68	"	×,088 = 5,984 + 6,153 =	12,137

BREMEN.

Accounts are kept in Rix Dollars and Grotes, reckoning 72 grotes to the rix dollar, which is equal to $2\frac{1}{4}$ marks.

100 lb. Bremen Weight are equal to 110 lb. English.
102 lb. - - - - - - 1 Cwt. = 112 lbs.
30 Veltes Bremen Liquid Measure equal to - - - - } 60 Gallons.
6 Stekans - - - - - 31½ "
100 Ells (double) - - - 125 Yards.
105½ Feet - - - - - 100 Feet English.
1⅓ Bremen Rix Dollar or 96 Grotes equal to - - - - } 1 Spanish Dollar.

The Bremen Last is equal to 80 bushels in the U. States.

DENMARK.

Accounts are kept in Danish dollars and Skillings, reckoning 96 skillings to the dollar.

"A new monetary system has been established in 1813, and by it the Rix-bank dollar is 27¼ d. sterling."

96 pounds Denmark make 100 pounds in the U. States.

Their weights are shippounds, lispounds and pounds—
16 pounds - make - 1 lispound.
20 lispounds, or 320 pounds - 1 shippound.

1. How much will 8 pieces of platillas come to, at 9 dols. 56 skills. per piece?

9 56
8

76 64 Ans. 76 dols. 64 skills.

2. A bill is drawn in Copenhagen for 18574 marks, 7 stivers, Hamburgh money, when the exchange is 128 Danish dollars for 100 rix dollars in Hamburgh, how many Danish dollars does it amount to?

NOTE. Three marks are equal to 1 rix dollar.

m. : *r.d.* :: *m.* *st.* : *r.d.* *sk.*
If 3 : 1 :: 18574 7 : 6191 46

r.d. : *D.d.* :: *r.d.* *sk.*
If 100 : 128 :: 6191 46 Ans. 7925 Dan. dols. 6 sk.

SWEDEN.

In accounts, 12 Runstycks make 1 skilling, 48 skillings 1 Rix Dollar. The Banco dollar is 50 per cent. better than the current dollar.

A late price current gives the exchange with London at 12½ Rix dollars for £1 sterling; with Hamburgh at 129 skillings per Rix dollar Ham. Banco.

Bills of Exchange are negotiated by sworn brokers, who are paid ¼ per cent. half by the drawer, and half by the purchaser, and no damage can be recovered on bills, returned protested, if not procured through *sworn* brokers.

All China goods sold here must be under the direction of the East India Company, but Bengal goods and spices may be sold as any other merchandize.

Weights—20 lbs. make 1 Lispound, 20 Lispounds=1 Shippound.

6 Shippounds of 400 lb. each victual weight } =1 ton Eng.
7½ " 400 each of iron " }

By which it appears that 1 lb. or 1 shippound victual weight is one fourth heavier than that of iron.

The victual last is 12 ship. the iron last 15 shippounds.

The tub of steel of 150 lbs. = 112 lbs. English.

All metallic exports are sold per shippound of iron weight.

All imports per lb. victual weight.

In Liquids—2 Stoops make 1 Kan, 100 Kans=69 Gallons.

The Ell is nearly 2 feet English.

In 1849 Sh. 19 Lis. 10 lbs. of iron, how many tons Eng. and what is the amount at £10 10*s.* per ton on board?

1849 19 10
20
36999
20
lbs.
7½*s.*=3000)739,990
Ans. 246,199 tons.
300

lbs. £ *lbs.*
300 : 10½ : : 73999*
10½
739990
36999,5
3,00)7769,89,5
2589,965
20
19,300
12
3,600
4
2,400

Ans. £2589 19 3½.

* Omitting the ciphers.

STETTIN.

Money. 1 Thaler (or thlr.) Prussian currency is reckoned for 24 Groschen, and 1 Groschen has 12 Pfennige.

Course of Exchange on London in March, 1825, was
— — 6⅔ Thlr. for £1 ster.

On Hamburgh, was 150 Thlr. for 300 Marks Banco.

100 lbs.	English give here - -	108 lbs.
100	Denmark - - - -	106
100	Hamburgh - - - -	103
100	Riga - - - - -	89
100	kilograms - - - -	213

58 gallons of rum are reckoned 1 hogshead.

100 yards English are 137 Ells of Stettin.
100 - - - - - - 158½ of Silesia.

1. Last of 72 Stettin scheffel, or bushels, gives about 14 English quarters.

110 lb. Stettin weight, is their Centner or hundred.

1. What will 10,000 gallons S. Sea oil come to, allowing 7½ lb. to a gallon, at 7½ thlr. per centner?
Ans. 4886 Th. 7 gr. 8 pf.

2. Sound Dues on 10,000 gallons of oil, at 1 thlr. 1 gr. per 480 gallons? Ans. 21 Th. 16 gr. 9 pf.

3. Reduce thlr. 4228 11 10 Prussian currency, to sterling, at 6⅔ th. per £. Ans. £618 16 1

RUSSIA.

Accounts are kept in Petersburgh, in Rubles and Copecs, reckoning 100 copecs to 1 ruble.

Their weights are Barquits, Poods, Pounds, and Zollotnicks—

96 zollotnicks	- make -	1 pound.
40 pounds	- - - - -	1 pood.
10 poods	- - - - -	1 barquit.

100 lb. Petersburgh weight are equal to 88¾ lb. in the United States.

In weights—the ton of Exports is 63 poods, and the pood of Imports is 36 lbs. Avoir.

6 Barquits make a Last.

A Chetwert is 46 bushels.

Their long measure is the Arsheen, of 28 American inches: nine arsheens are equal to seven yards.

3 versts	=	2 Eng. miles.
The Russian league		4½ "

All commercial business is transacted in the paper Ruble. The value of which, compared with the silver Ruble, is stated in the commercial regulations for the time by the Secretary of State. In July, 1827 it was valued at $10\frac{5}{16}d.$ ster.

In Russia, the Julian or Old Style is still used.

Great care is necessary in preparing a ship's papers for St. Petersburgh, if there is a cargo on board, "As nothing can be more rigid than the execution of the Impost laws."

		rub.	*cop.*
4997½ arsheens flems	24 rubles per 50 arsheens	2398	80
1700 do. drillings	34 copecs per arsheen	578	
2101 poods 25 lb. hemp	31 rubles per barquit	6515	04

RIGA.

In accounts—80 farthings, or ps. make 1 Albert Rix dollar. They have an imaginary money called Groschins, 90 of which make a dollar, and it is in this, that exchange is made.

In September, 1824, the rate on London was 292½ Groschins, equal to 3¼ Alberts, for £1 ster.

Weights—20 lbs. make 1 shippound, and 20 shippounds to 1 lispound, of 400 lbs. equal to 368½ lbs. Eng.

FRANCE.

The money of account was formerly in Livres, Sous and Deniers.

Accounts are now kept in Francs, of 100 Centimes each, equal to 18¾ cents. $5\frac{1}{3}$ Francs = 100 Cents.

The Franc is to the Livre, as . . 80 to 81
to the United States dollar . 16 3

Half of the sols or sous are pence sterling—20 sous =10*d.*
The Livres, less $\frac{1}{6}$, are shillings— . 24 Livres=20*s.*

Rentes in French funds are terms used for the dividends or interest paid on loans raised for the use of Government;—thus 1000 francs in the 5 per cents, are called 50 francs of Rente—which is a term generally synonymous with income or interest.

To change Francs to Federal Money.

RULE. From $\frac{1}{4}$ of the sum in francs, deduct $\frac{1}{4}$ of the same—the remainder is the answer.

EXAMPLE.

Change 894 francs 84 centimes to Federal money.

$\frac{1}{4}$)894,48	or, $\frac{1}{8}$)894,48	PROOF. 167,71½
		5⅓ f.=$1.
$\frac{1}{4}$)223,62	$\frac{1}{2}$)111,81	
55,90½	55,90½	838,57½
		55,90½ at ⅓
Ans. $167,71½	$167,71½	
		frs.894,48

To reduce Livres, &c. to Federal Money.

RULE. Multiply the sum by 5, and divide the product by 27.

EXAMPLE.

Reduce 6054 livres 15 sols to Federal money.

6054,75	PROOF.	9)6054,75 livres.
5		
		9) 672,75
3)30273,75		
		74,75
9)10091,25		
		5980,00 francs.
Ans. 1121,25		
		Equal to $1121,25

New Measures and Weights.

1 Tois for length	. . . .	76,73 Eng. Inches.
1 Metre	. . . . .	39,37 " "
1 Are . superficies	. .	1077,12 Square Feet.
1 Stere . solidity	. . . .	35,31 Solid Feet.
1 Litre . capacity	. . . .	61,02 Cubic Inches.
1 Gramme . weight	. . .	15,44 Grains Troy.
1 Kilograme	. . . . .	2,2 lbs. Avoirdupois.
2½ Hectolitres are equal to	. .	8 Bushels.

MARSEILLES.

Notes of Weights, Monies, &c.

Accounts are kept in Francs and Centimes, but prices are frequently quoted in Sous. 1 sous equals 5 centimes, 20 sous 1 franc.

The Marseilles lb. is 14 oz. 6 dr. Avoirdupois—the quintal or 100 lb. 89 lb. 14 oz. 3 dr. 100 lb. Avoirdupois equals 111¼ lbs. Marseilles weight.

The Kilograme legal French weight is 2 lb. 3 oz. 4 dr. ½ avoirdupois, or 15434 grains Troy weight. 100 lb. Avoir. equals ko. 45,434.

The Gold Coins of France, by act of Congress of 1816, are a legal tender at $17,45 per ounce standard; the standard weight of the 20 fr. piece being 4 dwt. 1 gr. 10 m.—the legal value of the franc is 17 cts. 72 m. which may be considered as the par with France.

The price of Spanish Dollars varies in Marseilles, according to the demand, from 5f. 25c. to 5f. 40c.

The Par of Exchange on London when Gold is at £3 17*s.* 10½*d.* per oz. is 25f. 22c.

When Pepper is at 9 sous per lb. (45f. per ql.)—Exchange on London 25 30—Advance in U. States 10 per cent.—The Exchanges leave the nett value of the franc 19c. ,01m.—9 sous at this rate gives 9½ cts. per lb. Avoirdupois; if the proceeds are invested in Spanish Dollars at 5,30, which is about the common rate, the value of the franc being then but 18,56, would leave but little better than 9¼ cents. From these are to be deducted landing charges, commission, interest, guarantee, allowance for dust, and cost of bags, say together about 11 per cent. The ordinary charges on other goods may be calculated at from 7 to 8 per cent.

Cotton at 22½ sous or 113,25 per 50 kilo.—the value of the franc 19 cents.

20	sous or	100,05	francs give	cents	17,30 m.
2	" or	10,00	" "	"	1,72
½ (of 1)		2,50	" "	"	,43
¼	"	1,25	" "	"	,21
22½	só. or fr.	113,75c.	equal to cts.		19,56 per lb. Avoid.

207995 lbs. of sugar - - - at fs. 45 per cent.	}	fs. 92661,78
——— discounting on the ½ 2 per cent.	}	
22702 " " coffee - - - - fs. 80 per cent.	}	18116,20
——— allowing for damp ½ per cent.	}	
1778,9 killos. indigo - fs. 18, 12½ per ½ kilo.	}	63195,42
——— discounting - 2 per cent.	}	

SPAIN.

Spanish reckonings are of two sorts, viz.

Money of Plate, distinguished by effective* or *hard* Dollars, &c.

Money of Vellon, distinguished by *current* dollars.

The former is $88\frac{4}{17}$ per cent. above the latter.

100 reals plate being equal to $188\frac{4}{17}$ reals vellon.

100 reals vellon	53½	do. plate.
17 reals plate	32	do. vellon.
17 piastres or current dollars	256	do. do.

4 maravadies make 1 quarto, 8½ quartos or 34 maravadies 1 real.

The peso. piaster, or current dollar of 8 reals plate, passes at 15 reals vellon in trade, but in exchange it is estimated at 15 reals vellon 2 maravadies.

The ducat of exchange is 375 maravadies.

* In drawing bills of exchange upon Spain this word is to be used, otherwise they may be paid in *current* dollars.

The real plate, is estimated at 10 cents, and the real vellon at 5 cents, in the United States.

The Spanish arobe, is 25 lb.

100 lb. of Spain is 97 lb. English.

To change Reals Vellon to Reals Plate.

RULE. Multiply the given sum by 17, and divide by 32 for reals plate.

To change Reals Plate to Reals Vellon.

RULE. Multiply the given sum by 32, and divide by 17 for reals vellon.

CADIZ.

Accounts are kept by some in hard or plate dollars, reals vellon, and quartos.

$8\frac{1}{2}$ quartos make . . . . . 1 real vellon.
20 reals vellon . . . . . 1 dollar of plate.

Others keep their accounts in reals plate and maravadies, reckoning 34 maravadies to 1 real plate.

A Last of salt is 77 bushels in Cadiz.

A Fanaga is equal to 1,56 bushel.

$49\frac{2}{5}$ Fanagas = 80 bushels, which would make it 1,6 bushel, or $1\frac{2}{3}$ bushel.

30 Cantaros of wine are equal to 124 gallons.

To bring Reals Plate into Dollars.

RULE. Multiply the given sum by 32, and divide by 17 for reals vellon, and divide the reals vellon by 20 for dollars.

To change hard dollars to reals plate.

RULE. Multiply the dollars by 20 for reals vellon, and the reals vellon being multiplied by 17 and divided by 32 give the reals plate required:—Or, Multiply the dollars by $10\frac{5}{8}$ for reals plate.

PRACTICAL QUESTIONS,

The answers to which are in dollars, reals vellon, and quartos.

1. What will 45940 pipe staves come to, at 80 piastres or current dollars per M. or 1200?

Ans. 2306 h. dols. 0 r. 1 q.

	Piast.	*d.*	*r.*	*q.*
21800 barrel staves at $30\frac{1}{2}$ per 1200 . . .		417	3	7
1200 hhd. do. 40 do. . . .		30	2	3
2 casks sherry wine 30 per cask . . .		45	3	4

In St. Lucar, accounts are kept in reals plate and quartos, 16 quartos to 1 real plate.

BILBOA.

Accounts are in Reals Vellon and Maravadies.
20 reals make 1 hard dollar, and $15\frac{1}{17}$ reals, a current dollar.
Weights.—The quintal is 100 lb. of 17 ounces.
ditto of iron 155 . 16 "
Measures. 32 Velts . . . . . 67 gallons.*
100 Fanegas of Corn . 152 bushels.

Fish is sold per quintal of 107 lb. of 17 oz.

Merino wool at Bilboa should be bought by the pila or pile, which is an assortment of R, F and T, or a proportion of them. The holders do not like to separate them, particularly the R, which is most valued in our manufactories. A pile of 100 bags, is 70 of R, 20 of F, and 10 of T. In the U. States, the proportion is $\frac{3}{5}$ R, $\frac{1}{5}$ F, and $\frac{2}{5}$ T. The first sort is the fine Leonesa, the second, Segoviana, the third, Sexiana. The bags weigh 200 lb. Bilboa weight, which is $6\frac{1}{4}$ per cent. heavier than English. Orders should be there in May or June for purchasing.

ALICANT AND BARCELONA.

20 reals Vellon make 1 effective or hard dollar.
$15\frac{1}{17}$ " " 1 current dollar of exchange.

Merchants keep their accounts with Americans in dollars and cents.

The Spanish quintal is 96 lb. or 114 lb. English.

The arobe is 24 lbs. of Alicant.

A pound is 18 oz..; a Modin 36 bushels, a Cahiz of Wheat is 7 bushels, and of soft Almonds $1\frac{3}{4}$ cwt. English.

Wine is sold by the half pipe of 20 Cantaros, of 3 gals. each,*
or per quarter 10
Brandy . . . . . pipe 40

Pipe staves are counted per M of 1200, half pipe staves 2 for 1, and barrel staves 4 for 1. Hoops per bundle of 80.

Salt is sold at La Matte per Modin of 24 fanegas, equal to 28 English quintals, or 33 bushels, giving 95 lbs. to a bushel.

PORTUGAL.

Accounts are kept in Millreas and Reas, reckoning 1000 reas to 1 millrea of 5*s.* $7\frac{1}{2}$*d.* sterling, or 1 dol. 25 cts. in the United States.

A vinten is 20 reas, and 5 vintens is a festoon of 100 reas.

* $3\frac{1}{15}$ gallons—Cambist.

Change 724 dols. 67½ cts. to millreas, at 1 dol. 25 cts. per millrea. Deducting ⅛ from the sum in Federal money gives the millreas, &c.

EXAMPLE.

	Proof.
⅛)724,675	⅛)579,740
144,935	
579,740	724,67½

MEASURES OF PORTUGAL.

Cloth Measure.

A vara is . . 43⅛ inches English.
A covedo is . 26⅞ " "

Wine Measure.

1 almude is . . . . 12 canados.
1 canado is . . . . 4 quarteels.
An almude is . . . . 4½ gallons English wine measure.
A canado is . . . . 3 pints English.

Corn Measure.

1 moy . . is . . 15 fangas.
1 fanga . . . . . 4 alquiers.
1 moy of 60 alquiers is 3 English quarters, or 24 bushels Winchester measure.
1 quarter . is . . 20 alquiers.
1 English bushel is 2½ alquiers in Lisbon, 2 alquiers in Oporto, and 2⅝ alquiers in Figuiras.
A moy of salt is the same measure as corn.
A pipe of coals is 16 fangas.
1 fanga is 8 alquiers.
A pipe of coals is 128 alquiers, which at 2½ alquiers per bushel, is 51⅕ bushels English.

A moy is 23 bushels in Lisbon.
25½ . . . Figuiras.
30 . . . Oporto.

WEIGHTS OF PORTUGAL.

1 arobe is 32 pounds.
A quintal is 128 lbs. Portugal wt. which is equal to about 132 lbs. English avoirdupois weight.
A pound is about 16½ ounces English.

LEGHORN.

Accounts are kept in Piastres, Soldi, and Denari, reckoning 12 deniers to 1 soldi, and 20 soldi to 1 piastre or dollar of 48*d.* sterling at par.

1½ paul, or 2 sols, are equal to	1	livre.
6 livres	1	piastre or dollar.
5¾ livres (effective money) .	1	do.
1 ducat	1⅛	do.

1 paul is equal to ¾ of a livre.

In January, 1825, the Spanish dollar = 6¼ livres.

Exchange on London, 49½*d.* per pezza.

Weights—A pound is only 12 ounces in all commodities.

145 lb. is said to be equal to the English quintal of 112 lb. but fish generally renders about 136 to 138 lb. per quintal.

145 lb. in Leghorn make 112 in the U. States.

4 brasses	1	cane.
100 brasses	64	yards, U. States.
1 palm	9½	inches, do.

4 sacks are 2 per cent. less than an English quarter of 8 bushels.

		piast.	*s.*	*d.*
100 barrels pork	16 piastres per barrel	1600		
1000 do. flour	10½ do. do.	10500		
2660 lb. coffee	26 do. per 100	691	12	0
9370 lb. rice	24 liv. cur. money per 100	374	16	0
97270 lb. logwood	16 piastres per 1000	1556	6	4
4170 lb. Russia wax	33⅓ ducats per 100	1629	15	6
104060 lb. sugar	30 piastres per 151 lb.	20674	3	5
3350 lb. loaf sugar	30 do. per 100	1005	0	0

NAPLES.

Accounts are kept in Ducats and Grains, reckoning 100 grains to the ducat.

The current coins are grains, carlins, ducats, dollars, and ounces.

10 grains - -	make - -	1 carlin.
10 carlins - - - - - - - -		1 ducat.
3 ducats - - - - - - - -		1 ounce.

The Naples dollar passes for 120 grains, and the Spanish dollar for 126 grains.

100 lb. Naples weight are equal to 64⅛ lb. English.

Brandy is sold per cask of 12 barrels, or 132 gallons; 60 karafts make a barrel.

Sewing silks are sold per lb. of 12 ounces.

Lustrings are sold per cane of 84 inches.

Sugar, coffee, fish, and tobacco, are sold per cantar, of 196 lb. in the United States.

The cantar is subdivided into 100 rotolas of 33 ounces each.

can.	*rot.*		*ducats.*		*duc.*	*gr.*
3	73	of coffee - - -	73	per cantar	272	29
16	19¾	soap - - - -	21	- - - -	340	14
7	64	raisins - - - -	12	- - - -	91	68
2 casks 11 bbls. 4 kar. brandy			102	per cask -	298	06

TRIESTE.

Accounts are kept in Florins and Kreutzers—60 kreutzers make 1 florin.

The other kinds of money are Soldi and Livres.

20 soldi - - - - make - - - 1 livre.
5¼ livres - - - - - - - - - 1 florin.

100 lb. Vienna weight = 123 lb. Avoirdupois

A brace is 27 inches, or ¾ of a yard English.

An orna of oil is 17 gallons.

A staro of wheat is 2⅔ bushels nearly—3½ staros are equal to an English quarter of 8 bushels.

Sales and purchases are usually made in bills on Vienna, at 3 months date.

GENOA.

Accounts are kept in Denarii, Soldi, and Pezzos or Lires

12 denarii - - - make - - 1 soldi.
20 Soldi - - - - - - - - - 1 pezzo or lire.
1 pezzo of exchange - - - - 5¾ lires.

The course of exchange is various—from 47*d.* to 58*d.* sterling per pezzo or lire.

In Milan, 1 crown = 80 soldi of Genoa.
In Naples, 1 ducat = 86 do.
In Leghorn 1 piastre = 20 do.
In Sicily, 1 crown = 127⅗ do.

The Spanish dollar was valued at 129*s.* 6*d.* in 1821.

A Cantar is 100 Rotola = 150 lb. of Genoa.
112 lb. Eng. . . . = 156 " "

A barrel of Oil is 187½ lbs. and contains 17 gallons Eng.
13⅞ barrels are a tun of . . . . 236 " "
A Mina is 3½ bushels, 2⅔ Minas = 8 bushels . . "

PALERMO AND SICILY.

Accounts are kept in Onges, Tarins and Grains.

20 Grains . . . . make . . 1 Tarin.
30 Tarins . . . . . 1 Onge or Ounce.

Feb. 3, 1803, the value of the money of Palermo in U. S. currency was as follows:

1 Grain . . . equal to . . . . . 4 Mills.
20 do. = 1 Tarin . = ... 8 Cents.
240 do. = 12 do.=1 Sc. dollar . . . =96 do.
600 do. = 30 do.=2½do. = 1 Onge =240 do.

The Spanish dollar is current at 252 grains. The value of the onge at par is 11*s.* 3*d.* sterling. The exchange on London, Feb. 3, 1803, was 56 tarins for the £ sterling, or 10*s.* 8½*d.* sterling per onge.

The Cantar of Sicily . = . . 176 lb. Avoirdupois.
The Rotola . . . . = . . 1¾ lb. do.
100 Rotola make a Cantar.

A Cantar of Oil is 25 gallons English measure. The Sicilian barrel contains 9 gallons.

Mahogony is sold by weight; one foot, board measure, will weigh about 2 rotola.

The measure called Caffis is 3½ gallons.
The lb. in Sicily is 12 oz. Avoirdupois.
The Salm is 485 lb. Avoirdupois.

VENICE.

Venice has three kinds of money, viz. Banco money, Banco current money, and Picoli money. Banco money is 20 per cent. better than banco current, and banco current 20 per cent. better than picoli.

The different denominations of money are Denari, Soldi Grosi, and Ducats.

12 denari, or deniers, d'or, make 1 soldi, or sol d'or.
5½ soldi . . . . . 1 gros, or grosi.
24 gros, or grosi . . . . . 1 ducat.

100 ducats banco of Venice in Leghorn = 93 pezzos.
100 " " of " in Rome = 68½ crowns.
100 " " of " in Lucca = 77 do.
100 " " of " in Frankfort =139 florins.

The par of exchange in 1798 was 50¼*d.* sterling per ducat banco.

MALTA.

In accounts, 20 grains make 1 Tari, 12 Taris 1 Scudo. The Spanish Dollar passes in the Government Offices for 30 Taris. In trade generally at 31 Taris.
Doubloons for 38¾ Scudos.

A salm of 16 tomoli is	8	bushels Eng.
The barrel of wine or Brandy. . .	11	gallons. "
A caliso	5⅓	" "
The cane	83	inches.

SMYRNA.

Accounts are kept in piastres and hundredths, except the English accounts, which from ancient custom are kept in piastres and eightieths or half paras.

The fractional parts are sometimes called aspers, 100 aspers to 1 piastre.

The following calculations are made in piastres and hundredths.

A piastre is equal to 40 paras.

The exchange on London was 13 piastres for 1 pound sterling in 1800, and in 1825 it was 47 piastres. The value of the piastre varying in that time from 34 to 9½ cents.

Their weights are the Rotola, Oke, Checque and Tiffee:

A rotola . . . . marked *Ro.*	is 180	drams.
An oke	is 400	do.
A cheque of opium	is 250	do.
A cheque of goat's wool . .	is 800	do. or 2 okes.
A tiffee of silk	is 610	do.

100 rotolas, or 1800 drams, or 45 okes are a quintal of this country.
112 lb. English should render here 40¾ okes, or 90¾ rotolas.
45 okes of this country render 123¾ lb. English.
A pike is 27 inches nearly.

PRACTICAL QUESTIONS.

1. How much will 10 serons of cochineal come to, weighing neat 724 okes 73 rotolas, at 80 piastres per oke?

724,73
80

Ans. 57978,40 piastres.

2. 299 bags of sugar, weighing 506 quintals 96 rotolas, tare 14 rotolas per bag, at 110 piastres per quintal?

gross	506 96	299
tare	41 86	14
neat	465. 10	1196
	110	299
Ans.	51161 00 piast.	100)4186
		41 86

3. 4 cases of opium, weighing gross 1026 rotolas, tare 84 okes 75 rotolas, at $10\frac{3}{4}$ piastres per cheque?

NOTE. 1 rotola is equal to $\frac{5}{7}$ of an oke, and 1 oke to $1\frac{2}{5}$ cheque.

	rot. 1026	
	9	
	20)9234 rot.	
gross okes	461 70	
tare	84 75	
neat okes	376 95	376 95
	$1\frac{3}{5}$	3
	376 95	5)1130 85
	226 17	226 17
cheques	603 12	
	$10\frac{3}{4}$	
	6031 20	
	301 56	
	150 78	
Ans. piast.	6483 54	

4. 893 pieces of copper, neat okes 19743,85, at $\frac{7}{40}$ or 70 pares per oke?

	O.	R.
	19743,85	
	70	
4|0)1382069|50		
Ans. piast.	34551,73	

5. What is the custom-house duty on 19740 okes of copper at $2\frac{1}{2}$ agio $2\frac{1}{2}$ per cent.?

NOTE. The charges are all established by a tariff of the Levant Company.

19740
$2\frac{1}{2}$

39480
9870

4|0)4935|0

agio $2\frac{1}{2}=\frac{1}{40}$)1233,75 amount of duty at $2\frac{1}{2}$ paras.
30,84 agio at $2\frac{1}{2}$ per cent.

Ans. piast. 1264,59

6. English consulage on 430 quintals, at $5\frac{1}{2}$ piast. agio 7 per cent.?

430
$5\frac{1}{2}$

2150
215

2365
7

Ans. piast. 165,55

7. Custom-house duties on 88 quintals 90 rotolas, at $\frac{2}{110}$, agio $2\frac{1}{2}$ per cent.?

88,90
20

11|0)1778|0

$2\frac{1}{2}=\frac{1}{40}$)16,16
,40

Ans. piast. 16,56

8. What will the following charges amount to, viz. porterage $\frac{3}{4}\%$, house porters $\frac{4}{4}\%$, weighing $\frac{2}{4}\%$, chan-duty $\frac{2}{4}\%$, visiting and marketing $\frac{1}{4}\%$ per quintal on 438 quintals?

porterage . . .	8	
house porters .	4	438
weighing . . .	2	17
chan duty . . .	2	
visiting	1	4|0)744|6
	17	Ans. piast. 186,15

The following is part of a very interesting article relative to the commerce of Smyrna, from the July number of the Oriental Herald.

The merchants of the different nations in Europe, resident at Smyrna, keep their books in piastres, and minor subdivisions of the same coin. The English subdivide them into 80; the French into 100; and the people of the country, that is, the Turks, Jews, Greeks, and Armenians into 120 parts. Bills of exchange are often drawn on Smyrna in foreign coin, particularly in Spanish dollars, which are always to be had there; but if drawn in a coin not in current use, the exchange of the day is established to make the payment. From Egypt they almost invariably draw in Spanish dollars, or Venetian sequins.

Current Coins.

The current Coins of Smyrna are as follows:

Silver—Piastres of 40 paras, which are the piastres of the Grand Seignior,
Piastres of 100 paras, worth 10 per cent. more than at Constantinople.
Piastres of 200 paros, very commonly called also Turkish dollars.

Gold—Stamboul of 290 paras, Funduc of 400 paras, with ½ and ¼ of each; and, like the former, worth more than at Constantinople.

The foreign Coins in general use at Smyrna are,

Silver—Imperial dollars worth 6½ piastres, issued from Austria.
Spanish dollars, the same nominal value, but preferred in large payments, as being of a little more value in Europe.

Gold—Ducats of Holland worth 13¼ piastres.
Ducats of Austria and Hungary, 13 piastras.
Venetian sequins, 13¾ piastres.
Spanish doubloons, 15 to 16 Spanish dollars.

Payments for goods sold, are generally made in light monies, which cannot be refused without protracting the payment for a long period. The merchants here assume the privilege of charging ½ per cent.; and some Europeans charge even 1 per cent. for that loss, under the

name of shroffage; but if sales are often made for cash, it will sometimes amount to 2 per cent.

The nominal values of coins in Turkey have augmented in a very rapid degree, while those coins have been as rapidly diminishing in their intrinsic worth; an effect which is produced by the frequent calling in of the current money by the Porte, in moments of demand, and issuing it again at a more advanced rate and debased quality. The result of this impolitic measure is the real depression of their coin, and an augmentation of the price of goods, as well as of the rate of exchange on foreign parts.

In the year 1803 the Spanish dollar was worth 3¼ piastres; in 1807, it had risen to 4½; and in 1812, it passed at 6½, though its true value remains nearly stationary. The Turkish dollar of 5 piastres is equal in weight with the Spanish dollar, and is intended by the sagacious Turks to represent the same kind of money; but its intrinsic value does not certainly exceed one-fourth of that coin. The Porte, having no silver mines, buys up the Spanish dollars for the supply of the mint, in which tin and zinc are the prevailing metals used. It is owing to these successive degradations of their piastres that, in lending money on interest, the sum borrowed is advanced in foreign coin, and the obligation is invariably to return the same kind of money, both in principal and interest. It has often happened, indeed, that between the period of a mortgage being made and released, the increase of nominal value in current money has amounted to 50 per cent. which would thus have ruined the lender.

The interest on money lent is as under:

To Franks or Europeans		10 per cent	per annum.
Levantines of first	credit,	12 per cent.	per annum.
" of second	credit,	15 per cent.	per annum.
Turks of first	credit,	15 per cent.	per annum.
" of second	credit,	20 per cent.	per annum.

Bills of exchange from any one part of Turkey on another, are drawn at eleven days; those from Turkey on Continental Christendom, at thirty-one days; and on London generally, at forty-five and sixty days.

Weights and Measures.

The various denominations of weights which exist in Turkey generally bear a reference to a certain number of drachms; but, properly speaking, all goods are weighed by the rotola, which is afterwards reduced into the other smaller weights in use for circulation. There is also a difference in the weight by a steelyard and by scales at a beam, the latter bearing a disadvantage to the scales of about three per cent.; but there are certain goods only sold by the balance, such as cochineal, cloves, nutmegs, &c.

1	Rotola has	180	drachms, and equals 1½ lbs.	Eng.
1	Oke	400	" 2 4-5ths	"
1	Quintal 45 okes	1800	" 155 "	"
1	Taffee of Brusa silk	610	" 4½ "	"
1	Checque of opium	250	" 1¾ "	"
1	Checque of goat's wool	800	" 5 3-5ths	"
1	Metical of gold, pearls, &c.	1½	"	

1 Kilo of corn, Constantinople standard, weighs about 23 okes.
1 " " Smyrna standard, 33 okes.
1 " of rice, in all Turkey, weighs 10 okes.
8½ Smyrna kilos of corn are equal to a salm, or an English quarter.
1 Pike, a cloth measure, is 27 inches, or three-fourths of an English yard.
106¼ Endezia, a measure of the shop-keepers, equal 100 pikes.

Conditions of Sale, Credit, &c.

The only articles which are always sold for cash, are cochineal, tin, Mocha coffee, and pepper. Other colonial produce sells at one or two months credit; but when articles are scarce, by sacrificing one or two per cent. on the price, cash may be readily obtained. All manufactured goods, excepting cloths, may be sold in small parcels, partly for cash and partly on short credit, when the articles are in demand and scarce; if, however, there is a plentiful supply to answer the demand, the credit is then extended to four and six months, and when the market is full, without demand, sales cannot be effected at less than eight or twelve months credit. In general, payments are made in three instalments, and in what has been already said, it must be understood as fixing the period for the final settlement of the account. When sales are forced in order to obtain cash, it is necessary to make a sacrifice of twenty or twenty-five per cent. and even then they cannot be effected to any great amount. The buyers of cotton manufactures are not considered so solid in their responsibility as the cloth dealers, yet there is not much risk with them, if sales are made with judgment. It may be observed that the trading capital of Turkey is very small, which forces the shop-keepers to buy on credit, and carry on their trade with the capital of the Europeans; and, as their payments cannot be made until the goods themselves are sold, there is an extreme degree of uncertainty in the most fixed periods. Colonial produce may be easily bartered for the produce of the country, excepting fruits, opium, silk, and copper, which are always bought with cash in hand. Manufactured goods are more difficult to be bartered for in this way, and never can be exchanged for the whole amount of their value only; as if 1000 piastres of goods are to be disposed of, 2000 piastres of produce must be taken, and the balance paid in cash. The buyers of cloth, though solid in the result, are long paymasters, extending the nominal credit of two or four months to one or two years; and though the Turks buy from the Europeans every thing on credit, yet, in the sale of their own productions, they almost invariably insist upon cash in hand.

The charge of warehouse rent is fixed at one-half per cent.; the house and street brokerage on importations at 2 per cent., and the same on exportations at 1½ per cent. All other charges are real, and must be specified. In the aggregate, therefore, the whole expenses on a parcel of goods sold may be calculated to amount to 10 or 15 per cent. ad valorem, and on those bought it will be more uncertain.

Opium is one of the most important articles of Turkey. It is the juice of the black poppy, a plant grown in Carissa, Ujack, and Jullah,

a distance of about ten days journey from Smyrna. It is sown in November and December, and in June the plant forms a ball, which contains the seed. In these balls incisions are made, from which oozes out a milky substance, which is collected gradually, and formed either into cakes about the size of a biscuit, or balls as large as a four-pound shot, when it is sent to Smyrna in baskets of from 85 to 90 checques each, about the end of July. This is also often adulterated, by being mixed with the juice of other fruits. For this reason, it is usual to have it examined by connoisseurs of the article, who receive one-half per cent. for their inspection, and if found thus mixed, it is returned to the seller. This article, if bought from the end of July until November, will lose 6 or 8 per cent. in weight. After December, it will scarcely lose any thing; and neither the quality or strength are deteriorated by being kept five or six years, though it hardens. A good crop will yield 1500 baskets, and an ordinary one from 1000 to 1200; of which quantity it is known, with certainty, that not more than 200 are used in the Turkish empire, so that the practice of chewing opium, though still considered general here, is less universal among the people than would be imagined. It is even calculated, by long residents among them, that throughout the Turks of all classes, there are not more than two in a hundred who use this pernicious drug. The best qualities are exported by the English and Americans for their separate speculations to China, and various parts of the East Indies.

GRAIN cannot be exported from Smyrna without a firman, or express permission from the Grand Seignior; but though this prohibition extends over all parts of Turkey, yet it may always bo loaded from the smaller ports by bribing the custom-house officers, who, in the farming of their situations from the Porte, calculate such gains as necessary and honourable profits, and regulate their purchase money according to the greater or less facility of reimbursing themselves by such means. The principal places of export for grain from Anatolia, are Scalanuova and Sanderlee; but all the business at those places is done through the merchants of Smyrna. The Gulf of Salonica, the coast of Caramania, Satalia. and Syria, also export large quantities of grain; but Egypt is the chief granary of the East, whose harvests are scattered over all the Mediterranean. At all those places grain must invariably be purchased with cash, and for that purpose Spanish dollars are found to be most generally acceptable. In time of peace between Russia and Turkey, the Black Sea furnishes also immense supplies of grain; but if a vessel from that sea should be driven, either by stress of weather, necessity, or convenience, into a Turkish port, the bakers of the country may stop the cargo, by paying for it a price arbitrarily fixed by their own government; which is the case with hemp, and other articles from the Black Sea, which the Turks may, at any time, be likely to want. To obviate this evil, vessels touching at ports often anchor without the castles which guard their entrance; while in town, the goods are easily sold, and transferred to European vessels.

RICE, which is an article of food in universal consumption throughout Turkey, arrives here chiefly from Egypt, and is sold for

cash, by the kilo of ten okes, which is worth at present 6½ piastres. Scarcely a meal is made, either by the Turks, or Christian natives of Turkey, without a pilau or dish of boiled rice, which makes its consumption immense, and there is never a scarcity in the markets. Carolina and India rice are well known, but as they are not so much esteemed, they sell, in general, about ten per cent. less than the rice of Egypt.

EAST INDIES.

CALCUTTA.

Accounts are kept in Rupees, Annas and Pice.

COINS.

12 Pice	make	1 Anna
16 Annas		1 Rupee
16 Rupees		1 Gold Mohur.

CURRENCY.

12 Current Pice	make	1 Current Anna
16 Current Annas		1 Current Rupee.

The E. I. Company's accounts were formerly kept in currency, but are now kept in Siccas.

100 Sicca Rupees equal to		116 Current Rupees.
100 Sonaut "		111 " "
100 Bombay "		110 " "
100 Arcot "		108 " "

Small shells called Cowries, used in paying Coolies, &c. are reckoned as follows, viz.

4 Cowries	make	1 Gunda.
20 Gundas		1 Pun.
16 Puns		1 Kahun.
4 Kahuns		1 Rupee.

This is the table in reckoning, but the price is generally from 4 to 6 kahuns and odd piece in the Bazar.

Reckoning by the Tale.

4 Particulars	make	1 Gunda.
5 Gundas, or 20 Particulars		1 Corge.

The cubit is 18 inches.

Bazar or Great Weights.

5 Sicca weight	make	1 Chittack.
16 Chittacks		1 Seer.
40 Seers		1 Maund.

The Factory Maund is . . . . 74⅔ lbs. Avoir.
The Bazar Maund is . . . . . 82$\frac{2}{11}$ " "
10 Bazar, or 11 Factory Maunds = 821¼ lb. Av.

How many Bazar Maunds in 676 M. 17 S. 9$\frac{3}{7}$ Cks. F. weight.

	M.	S.	C.
Deduct $\frac{1}{11}$)	676	17	9$\frac{3}{7}$
	61	19	12$\frac{3}{77}$
Ans.	614	37	12$\frac{72}{77}$ Baz. wt.

Proof.

Add $\frac{1}{10}$)	614	37	12$\frac{72}{77}$ B. wt.
	61	19	12$\frac{3}{77}$
	676	17	9$\frac{3}{7}$ Fac. wt.

NOTE. 1$\frac{1}{2}$ Factory Maund is equal to 1 cwt. Eng.
Or 74$\frac{3}{4}$+37$\frac{1}{2}$ lb.=112 lb.

To reduce English Weight to Factory Maunds.

RULE. For cwts. and quarters—Multiply the cwts. by 1$\frac{1}{2}$ for Maunds, and take parts for the quarters, at 60 Seers per cwt. If the quantity be in pounds—Take half of the pounds for Seers, and add to it $\frac{1}{14}$ of the same half, and divide the sum of both by 40 for Maunds.

EXAMPLE.

In 485 cwt. 3 qrs. how many Factory Maunds?

		M.	S.	Cks.
At 1	M.	485	0	0
"	$\frac{1}{2}$	242	20	0
" 2	qrs.	30	0	0
" 1	. . . . .	15	0	
	Ans. F. Mds.	728	25	0

Reduce 6789$\frac{1}{2}$ lbs. Av. to Factory Maunds.

6789$\frac{1}{2}$ lbs.

$\frac{1}{2}$ = 3394 12
$\frac{1}{14}$ = 242 7$\frac{7}{5}$

4,0)363,7 3$\frac{4}{7}$

Ans. F. M. 90 37 3$\frac{4}{7}$

Or thus, for $\frac{1}{14}$

2)3394 12

7)1697 6

242 7$\frac{1}{5}$

Deducting $\frac{1}{11}$ gives the Bazar weight as before.

Cwt.	qr.	lb.		M.	S.	Cks.	
126	0	20$\frac{1}{2}$	are equal to	189	10	13	Factory wt.
132	1	19	. . . . .	198	25	2$\frac{6}{7}$	" "
94	2	23	. . . . .	129	5	8	Bazar "
411	1	6	. . . . .	560	34	12	" "

A TABLE *for reducing English weight to Factory Maunds, by inspection.*

Eng. Weight.	*F. M.*	*Srs.*	*Ctks.*	*7ths.*	*lbs.*	*Srs.*	*Ctks.*	*7ths.*
Cwt. 100	150	—	—	—	14	7	8	—
40	60	—	—	—	12	6	6	6
30	45	—	—	—	11	5	14	2
15	22	20	—	—	10	5	5	5
5	7	20	—	—	9	4	13	1
4	6	—	—	—	8	4	4	4
3	4	20	—	—	7	3	12	—
2	3	—	—	—	6	3	3	3
1	1	20	—	—	5	2	10	6
qrs. 3	1	5	—	—	4	2	2	2
2	0	30	—	—	3	1	9	5
1	0	15	—	—	2	1	1	1
lbs. 24	—	12	13	5	1	—	8	4
20	—	10	11	3	oz.			
19	—	10	2	6	8	—	4	2
18	—	9	10	2	4	—	2	1
16	—	8	9	1	2	—	1	—

USE OF THE TABLE.

Cwt, qrs. lbs.

Reduce 415 3 24½ to Factory Maunds.

Cwt. 400	=	600	0	0
15	=	22	20	0
3 qrs.	=	1	5	0
24 lbs.	=	0	12	13⅝
8 oz.	=	0	0	4⅞
Ans.		623	38	2 Factory Weight.

What will 522*m.* 31*s.* 6*cks.* of sugar come to at 5 Rupees per Maund? Ans. Rs. 2613 14 9.

How much will 465 pieces of cloth come to at 23 Rupees per Corge? Ans. Rs. 534 15 0.

A shipped $6000 in the Washington, for Calcutta, at 8½ per cent. for freight, and 2½ per cent. for commission. On sales of the dollars there, at 207 sa. rupees per 100, required the net proceeds remaining for investment?

	Sa. Rs	*A.*	*P.*
6000 Dollars at 207 Sa. Rs. per 100 . .	12420	0	0
Freight at 8½ per cent.	1055	11	2
Commission at 2½	310	8	0
Net proceeds remaining for investment . .	11053	12	10
Proof, Sa. Rupees	12420	0	0

A Captain bound to Calcutta received of A. D. & Co. $2500 at 8½ and 2½ per cent. for freight and commission. On his arrival there, he sells the dollars at 207 sa. rupees per 100. The amount of his investment for them was Sa. Rs. 4509, on which he received a drawback of Rs. 84 14 0. Supposing A. D.'s part of expenses of package, screwing, cooley-hire, &c. to be Rs. 176 10 6, what was the balance on stating the account in Calcutta, and in whose favour?

Ans. Sa. Rs. 4 15 7 in favour of A. D. & Co.

A's dollars in the Washington, Capt. M. for Calcutta, amounted to $5999.* On deducting $6,44 for short weight, they were sold there at Sa. Rs. 210$\frac{1}{2}$ per 100—and A's credit of interest was Sa. Rs. 55 15 6. Capt. M's commission was at 2½ per cent. on the specie. The cost, &c. of the return cargo, which was on freight, amounted to Sa. Rs. 12289 10 7, and A's part of the expense of house rent was Sa. Rs. 37 6 4; Required the balance on stating the account in Calcutta?

Ans. Sa. Rs. 0 8 2 in favour of A.

*$6000 less 1, bad.

The following method of arranging the sales, freight and commission in any port, (if there be different shippers) will aid a Captain or Supercargo in seasonably detecting errors in his calculations.—And a similar statement for the return cargo will be serviceable to those, who do not state their accounts in the Italian manner, or double entry. The terms of shipments being at 8½ per cent. for freight, and 2½ per cent. for the Captain's commission, and the price 207 sicca Rupees per $100 in Calcutta.

Shippers.	Dollars	Sa. Rs. A. P.	Freight.	Commission.	Net Sales.
A	1000	2070 0 0	175 15 2	51 12 0	1842 4 10
B	6000	12420 0 0	1055 11 2	310 8 0	11053 12 10
C	5000	10350 0 0	879 12 0	258 12 0	9211 8 0
D	4000	8280 0 0	703 12 10	207 0 0	7369 3 2
E	2000	4140 0 0	351 14 6	103 8 0	3684 9 6
F	500	1035 0 0	87 15 7	25 14 0	921 2 5
G	3000	6210 0 0	527 13 7	155 4 0	5526 14 5
H	3800	7866 0 0	668 9 10	196 10 5	7000 11 10
I	5000	10350 0 0	879 12 0	258 12 0	9211 8 0
K	900	1863 0 0	158 5 9	46 9 2	1658 1 2
L	1000	2070 0 0	175 15 2	51 12 0	1842 4 10
M	250	517 8 0	43 15 9	12 15 0	460 9 2
	32450	67171 8 0	5709 9 3	1679 4 7	59782 10 2

RECAPITULATION.

	Sa. Rs.	A. Rs.
32450 Dollars at 207 Sa. Rs. per 100 .	67171	8 0
Freight at 8½ per cent.	5709	9 3
Commission 2½ "	1679	4 7
Net sales remaining for investment . .	59782	10 2
Sa. Rs.	67171	8 0

Indigo, Iron and Salt-Petre are sold in Calcutta by the Factory maund. Sugar and Ginger by the Bazar maund.

When the return cargo or investment is on freight, Sugar and Salt-Petre are taken per ton in weight; other goods by measure.

The Corge of 20 pieces of Bale goods consists of three qualities, viz. 5 of A, 7 of B, and 8 of C. Care should be taken, that the 2d and 3d qualities be not too inferior in proportion to the first, which are on the top. The difference should not be more than 5 per cent. between the 1st and 2d, and 8 per cent. between the 2d and 3d.

Bengal Indigo is classed under the following kinds—Blue, purple, violet, and copper.—The chief signs of good indigo are its lightness and feeling dry between the fingers, its swimming light in water—If thrown on burning coals, it emits a violet-coloured smoke, and leaves but little ashes.—The large, regularly-formed cakes should be preferred, when of a fine, rich, blue colour, externally free from the white adhesive mould, by the incrustations of which the indigo is much depreciated.—When broken, it should be of a bright, purple cast, of a close texture, free from specks or sand, and of a shining, copper-like appearance, when rubbed on the nail.—The heavy, dull-coloured, and porous should be rejected. Likewise the small, broken pieces, which, though equally good in quality with the regularly formed cakes, do not obtain an equal price.—What is called the burnt indigo may be easily known, by its being full of cracks, and its appearing as if the cakes would easily crumble.

Re-manufacturing the inferior kind of indigo has been lately practised, in order to give the cakes a fairer appearance, but in doing it, much of the colouring substance is lost.

BOMBAY.

Accounts are kept in Rupees, Quarters, and Rees.

100 rees make 1 quarter; 4 quarters 1 rupee.

218 rupees were equal to 100 Spanish dollars, in April, 1800.

The current money is in Mohurs, Rupees, and Pice.

50 pice make 1 rupee; 15 rupees 1 mohur.

The weights are pounds, maunds, and candies; the pound the same as English.

A Bombay maund . . . . . is 28 lb.
A Surat maund . . . . . is 37½ lb.
21 Surat maunds or 784 lb. make 1 Surat candy.

Cotton is sold by the Surat candy.

Camphire and Mocha coffee are sold by the Surat maund.

Malabar pepper is sold by the Bombay candy of 588 lb.

In 274 bales of cotton, weighing neat 996 cwt. 2 qrs. 23 lb. how many Surat candies?

784 lb. = 7 cwt.

7)996 2 23

142 200 two hundreds.
24 excess 12 per cent.
56 2 quarters.
23

303 Ans. 142 can. 303 lb.

MADRAS.

Accounts were kept in Pagodas, Fanams, and Cash.

80 cash make 1 fanam; 36 fanams 1 pagoda.

The Spanish dollars were in 1798 and 1799, at 165 dollars for 100 star pagodas; making the pagoda worth 165 cents. The revenue laws of the United States reckon them at 184 cents.

By a late regulation the silver rupee is the standard coin, and in it public accounts are kept, The Star Pagodas are changed into Rupees at 350 Rupees for 100 Star Pagodas.

The new silver Rupee is 1*s.* 11*d.* sterling.

A Lack of rupees is 100,000. A Crore is 10 Lacks.

The picul is 133⅓ lb. English.

100 cattas make a picul.

A maund is 25 lb. Troy; 20 maunds make 1 candy.

The excellence of their cloth is defined by the *threads* in the warp.

The duty payable at the custom-house is 2½ per cent. outwards and inwards. This is taken on imports according to the invoice, and on exports at the actual cost at the bazar or market.

JAVA.

The money of account is the Florin and its parts in stivers, or in centimes. In 1826 the Florin was valued at 39½ cents in Samarang.

The Picul of 100 Cattas is equal to 125 Dutch lbs. or 133⅓ lbs. English.

What will 5188 piculs 11 cattas of Coffee come to at $22,24½ cts. per picul, charges included?

Ans. $115393,93

Great attention is to be paid to the quality of coffee purchased here, if intended for the Dutch market. The best quality is the brown Java, then the yellow, and the least valuable is the pale yellow. A price current from Amsterdam quotes them, viz.

Pale Yellow, 7 stivers, Old Yellow, 8, and brown Java 11 stivers per lb. In selecting for the American market, it should be of a green colour, and well cured.

When weighing coffee out of the public stores, great care is necessary, as means are frequently used to deceive in the weight. Through want of such vigilance, there is often a loss of 3 to 5 per cent.

If coffee be purchased, receivable on the coast, it is necessary to be particular in specifying the quality, as it sometimes happens, that an inferior quality is put off in this way. A bond in this case is necessary. The best months on the coast are July, August, and September, before the coffee is sent round to Batavia.

A vessel to obtain a cargo of coffee at Batavia should arrive there in October, November or December. The last company sales are about the middle of January.

It is important to procure the requisite certificates of having paid the export duties at Batavia, according to the regulations of foreign trade, by which a part of the export duties paid in Batavia, will be repaid in Holland, provided no part of the cargo had been discharged in any other country, except in case of distress.*

Opium is not admitted to be landed in boxes of less than 125 Dutch pounds, but it is allowed to be repacked on board.

In stowing sugar, it should not be in contact with coffee, as the flavour of the coffee will be injured by it, and in Holland especially, the taste is much consulted.

CANTON.

10 Cash . . . . make . . 1 Candareen.
10 Candareens . . . . . 1 Mace.
10 Mace . . . . . 1 Tale.

The weights are the Picul, Catty, and Tale. The tale is 1⅓ oz. Avoir.

16 Tales make 1 Catty = 1⅓ lb.
100 Catties . . 1 Picul = 133⅓

The Spanish dollar is current at 72 Candareens.

The Covid of 10 Punts = 14,625 Eng. inches.

* The Return duty in Holland in 1826, on a cargo of coffee at 2⅟₁₀ fl. per picul, was Ind. Flor. 15212 7, for which the government paid 18254,68, Neth. Florins.

In 34506 tales 7 mace and 6 candareens, how many dollars?

	Or thus,
8)3450676,00	$\frac{1}{3}$)3450678
9)431334,75	$\frac{1}{6}$)1150226
	191704$\frac{1}{3}$
Ans. $47926,08$\frac{1}{3}$	$47926,08$\frac{1}{3}$

In 209132 lb. Av. how many piculs?

$\frac{1}{4}$)209132
52283

156849

Ans. 1568 Piculs 49 Catties.

How many lb. Av. in 1568 piculs 49 catties?

$\frac{1}{3}$)156849
52283

Ans. 209132 lb.

What will 1568 piculs 49 catties of Tea come to at 22 tales per picul?

1568,49×22=34506,78
$\frac{1}{3}$=11502,26
$\frac{1}{6}$= 1917,04$\frac{1}{3}$

Ans. $47926,08$\frac{1}{3}$

The Hong merchants who exercise a summary power in the commerce of this place, consist of a number of persons, selected from the most opulent and respectable merchants of Canton, nominated by the Hippo, or Viceroy, and sanctioned by the Emperor. They are very limited in number, being twelve in 1793, and increased to fourteen in 1803.

They are jointly and individually responsible for each other to the Emperor and to foreigners trading with them, and no article can be imported or exported without a chop or certificate from a Hong merchant. No foreign ship can enter until a Hong merchant becomes responsible to the Emperor for every person on board, and also for payment of all duties and exactions. This security will not be given by any prudent, solid merchant, without an engagement on the part of the Captain or Supercargo, to trade with him to a certain amount; beyond this stipulated sum, he is at liberty to trade as he pleases. But as the ship may remain 12 or 14 days without entering, the captain has sufficient time to ascertain the state of the market, and to

select the Hong merchant, who will best acommodate him as to the terms, and the time of furnishing the cargo.

All goods purchased of the Chinese are to be delivered along side of the ship, free of duty or expense to the purchaser, but it is necessary to guard against the fraudulent attempts of the lightermen, while on their passage to the ship, and also when they are passing the goods on board.

Certain silk goods having been lately made, short of the proper measure, it is now necessary to inspect them closely; since pieces, intended for particular patterns, are much injured in this way. And as some goods, when coloured, especially black, gain in the weight, it is necessary to be particular in this respect when contracting. Thus, should 18 tale white crape be contracted for, to be furnished in black, it should then weigh 19½ tales, to correspond with the agreement.

The Chinese year commences about the beginning of February, at which time all accounts must be settled among merchants, and the balances paid. or else a loss of credit ensues, which with them is a species of bankruptcy. This renders them very desirous of selling the goods they have then on hand, to enable them to comply with their engagements.

As it may sometimes be contemplated, in arranging a voyage beyond the Cape of Good Hope, to send part of the *return cargo* immediately to Europe in the same vessel from the United States, it is important in making the Manifest, to say—*for* ——— *in the United States and for Europe.* In such case the merchant is not obliged to land any more than he wishes, and there is then a saving of time and expense, and also of the loss that would arise on the drawback, if the goods were landed.

MANILLA.

Money—	12 Grains	1 Rial.		
	8 Rials	1 Peso, or Dollar.		
Weights—	25 lbs. .	1 Arobe.		
	4 Arobes	1 quintal	= 104 lbs.	Eng.
	100 Catties	1 picul	= 142 "	"
Measures—	The Vara or Spanish Yard		= 33⅓ inches	Eng.
	" Cavan		2¼ bushels	"

The principal articles of this Island, suited to the European or North American market, are sugar and indigo.

"The sugar is brought to market in its raw state, and when clayed produces three qualities, first, second, and third. It is for the advantage of a supercargo, who selects for the European or North American market, to purchase all of the first quality, even at a higher rate, on account of its superior character in those countries, as well as the saving of freight."*

The indigo is brought from the provinces in sacks, and is of two kinds, or first and second quality in each sack. Great care and cir-

*White.

cumspection are requisite in selecting it. It is necessary to examine every cake, when purchased of the natives, "as they are in the habit of mixing other substances with it, such as stones, mud, &c."* The shape of the cake is no proof of the quality, as the hard, or what is termed the burnt indigo, being of a more firm or flinty consistence, is more likely to retain its shape.

The first quality is of a deep blue or purple colour, porous, breaks easily, weighs light, and when put into water, should be buoyant, at least two thirds of it should be above the surface. It is the more necessary to try it in this way, as one mode of deception, practised by them, "is to keep it for some time before delivery in a damp vault or cellar to increase its weight by absorption of moisture, to which its porosity renders it pervious. The best indigo is produced in the Lagunna or Lake district."*

COLUMBO, ISLE OF CEYLON.

The money is in paper, silver, and gold.

Paper money is in the bills of the Company, and is of uncertain value.

Silver is in the rupees of the different parts of India.

The Sicca rupee is worth more than any other by 7 to 8 per cent.

Gold is the Mohur pagoda.

The exchange is various, as silver is rarely seen.

6 stivers	make	1 shilling Flemish.
8 shillings		1 rix dollar.
30 stivers		1 rupee.
64½ do.		1 Spanish dollar.

JAPAN.

Accounts are in Tales, Mace, and Candareens.

10 candareens make 1 mace.

10 mace . . . . 1 tale = ⅔ of a dollar, or 75 cents.

10 mace are equal to 1 rix dollar.

6 tales make a corban, a gold coin not used in accounts.

In Weights—10 tales make 1 mace; 16 mace 1 catta.

The ichan or hickey is 3½ feet.

The balee is 65 quarts.

Thirty-five per cent. was the duty on privileged imports in 1799. It is on the exports (which are all free of duty) that the Dutch make their profit upon their return to Batavia. A privilege is granted to the captains of the Dutch ships to carry money, which often sells at an advance.

* * White.

How much is the neat proceeds of 4 silver watches, at 35 tales each, deducting the duty of 35 per cent.?

35 tales.
4

140
35 per cent.

700 Sales 140
420 Duty 49

49,00 Ans. neat proceeds 91 tales.

FORM OF AN ACCOUNT OF SALES.

	tales.	Duties. *tales.*	Neat. *tales.*
4 silver watches, 1st kind	35	49	91
6 silver watches, 2d kind	23,1	48,5,1	90,0,9

The article is given in the first column, the price in the next column, the duties in the third, and the neat proceeds in the fourth.

WEST INDIES.

JAMAICA AND BERMUDAS.

Accounts are kept in Pounds, Shillings, and Pence.

The Spanish dollar passes at 6*s* 8*d*.—3 dollars make 1 £.

To change Jamaica currency to Federal money.

Rule. Multiply the pounds by 3 for dollars. If there be shillings, &c. increase the pence in the given sum by $\frac{1}{4}$ for cents.

Example.

Change £54 12 11 Jamaica currency to Federal money.

£54 12 11 = 13115 pence.
$\frac{1}{4}$ = 3278$\frac{3}{4}$

Ans. $163,93$\frac{3}{4}$ cents.

102896 feet of boards at £15 per M.	£1543	8	9
8519 lbs. of Sugar at 70*s*. per 100.	298	3	3
5 hhds. Sugar, Gross 86 cwt. 2 0 tare 585 lb. at 75*s*. per 100, and 5 hhds. at 30*s*.	348	17	3

BARBADOES.

The Spanish dollar is 6*s.* 3*d.* currency.

To change Barbadoes currency to Federal money.

RULE. Increase the pence in the given sum by $\frac{1}{3}$ for cents.

EXAMPLE.

Change £49 11 10 to Federal money.

£49 11 10 = 11902*d.* Proof. 15869$\frac{1}{3}$ cents.

$\frac{1}{3}$ more 3967 $\frac{1}{4}$ less 3967$\frac{1}{3}$

Ans. $158,69$\frac{1}{3}$ 11902 pence.

MARTINICO.

The money of account is in the Franc of 100 centimes.

The Franc is valued at . . . . . 18 cents.

The Livre . . . . . 10 "

45 Livres are equal to . . . . . 25 Francs.

The Current dollar is . . . . . 90 cents.

The Round dollar . . . . . $5\frac{40}{100}$ Francs.

The difference between them is *there* said to be 10 per cent. in favour of the Round dollar. It is therefore necessary, if the bargain be made in dollars, to ascertain the kind before contracting. Stating it in Francs would prevent any difficulty.

The Kilograme is 2$\frac{1}{5}$ lbs. Av. 100 Kilos = 220 lbs.

The Hectolitre is 2$\frac{1}{4}$ Bushels.

GUADALOUPE.

185 Livres Guadaloupe currency = 100 Francs.

A Spanish dollar is 10 Livres Currency.

A Current dollar is 9 do. do.

A Spanish Doubloon is 16 Spanish dollars, or 160 Livres.

A Guinea " 49 Livres 10 Sous.

A Joe of 3 drams 54 grains = 85$\frac{1}{2}$ Livres.

All kinds of gold pass current,—Portuguese and Spanish gold is at 22$\frac{1}{2}$ Livres per dram of 72 grains.

American gold at 20$\frac{1}{2}$ Livres per dram of 72 grains.

CUBA, PORTO RICO, TRINIDAD.

Accounts are kept in Havana in Dollars and Rials, reckoning 8 Rials plate, or 20 Rials vellon to the dollar.

The par with London is $444 per £100.

" " " France is 5 Francs per dollar.

On the South side of the Island,—St. Jago and Trinidad, Doubloons pass at $16, in lieu of $17, as on the North—Havana and Matanzas.

The Spanish Arobe is 25 lbs. 4 Arobes make a quintal.

100 lbs. Spanish = 104 English.
108 Varas = 100 yards English.
140 " = 100 French Ells.

One Fanega is 3 bushels nearly, or 200 lbs. Spanish.

The Tonnage duty on Foreign vessels is 20 Rials or $2½ per ton.

The keg of 5½ gallons in Havana is considered to make but 5 gallons in the United States. The loss on the gauge or measure being about 10 per cent.

In buying white or yellow sugar, there is an augmentation of ½ to 1 Rial per arobe on either quality, according to the demand for that particular one. The shipping charges are always the same. White being valued at 12 rials, and Brown at 8 rials per arobe.

What will 42 bbs. of white Havana Sugar come to, weighing gross 415 Ar. 18 lbs. Tare and tret on the whole 858 lbs. at 26 rials per arobe?

	ar.	*lb.*
	415	18
858 lb. =	34	8
	381	10
	26	
	2286	
	762	
10 lbs. = ⅖ Ar.	10	
	8)9916 Rials.	
Ans. $1238	4	

What is the export duty on 1500 arobes of assorted sugars, ⅗ White, and ⅖ Brown, valued at 12 and 8 rials, at 6¾ per cent.?

⅗ of 1500 = 900 at 12 rials = $1350
⅖ of 1500 = 600 at 8 " = 600

1950
At 6¾ per cent.

Ans. $131,62½ cents.

Required the import duty on a cargo of Jerked Beef, valued, viz.

G . . .	14311 Ar. at 10 Rs.	} at 14 per cent.	
D . . .	3199 " 6		
S . . .	845 " 3		

Ans. $2884 5 Rs.

		dls.	rls.
125	pieces bretagnes at 26 reals	406	2
500	do. do. . 24½ do.	1531	2
80	umbrellas . . . 6½ dollars . . .	520	0
147	arobes of butter 25 do. per 100 lb. . . .	918	6
2405	arobes of 19 lb. sugar 25 reals per arobe . .	7518	0
1660	do. 12 lb. do. 21 do. do. . .	4358	7
6695	feet boards . 40 dols. per M. . .	867	6

PORTO RICO.

The current money is the Spanish dollar and its parts of $\frac{1}{4}$, $\frac{1}{8}$, and $\frac{1}{16}$ths, under their Spanish names.

There is often a premium of 10 to 15 per cent. on the Doubloon of $16, nominal value.

ST. THOMAS.

Merchants generally state their accounts with the Americaps in Dollars and Cents—but the currency consists of real and imaginary moneys. The real are stivers, bits and two-bit pieces. The Doubloon with the parts, viz. $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$ and $\frac{1}{16}$ths. The stiver is a brass coin, of which there are 75 to a dollar. The bit is a coin, part silver and part brass, and equal in value to 5 stivers. The two-bit piece is of the same metal, twice as large and double in value to the other. The Doubloon goes by weight and passes for $16, if it weighs a Spanish dollar. The parts of the Doubloon pass at the nominal value.

ST. MARTINS.

On the French or south side of the island, the government standard of France is the money of account—But sales are frequently made for dollars, which have to each, 8 bits, of 6 stivers each.

Four twenty cent pieces with heads pass for a dollar, giving only eighty cents to the dollar.

On the Dutch side, 6 stivers make a bit, 8 bits are called a piece of Eight—12 Bits make a current dollar—15 Bits make a Spanish dollar. There are small pieces of silver,

or 5, 6, 9, and 10 stiver pieces. The value of the Doubloon depends on the plenty or scarcity of money. It is generally at 19 to 20 dollars.

The English measures are used in buying and selling on both sides of the island.

The Dutch 100 lbs. = 110 lbs. English.

ST. EUSTATIA.

This place has the same currency as the Dutch side of St. Martins.

BRAZIL—RIO JANEIRO.

The standard or par value of a Spanish dollar was formerly considered at 800 reis, but it is now enhanced by Government to 960 reis, by the coinage of the dollar bearing that value in Bank Paper.

The Quintal is 4 arobes of 32 lbs. each, 100 lbs. = 102½ lbs. Eng.

The Vara is 43½ inches, the Covado = 26¾ inches.

180 Medidas = 140 gallons, 12 alquiers = 13 W. bushels.

Sugars.—The best sugars are those which come earliest to market. Age makes a material alteration in the quality by rendering them damp, and destroying the chrystallization. The crop generally begins to appear in October, and by February following it is nearly all brought in.

Coffee.—The greater part of the crop is exported from July to December, during which period, the quality is better than that which comes to market in other months. Coffee embarked on board vessels partly laden, generally loses colour. When vessels are entirely full, this complaint is seldom made.

The custom of this port is, that the expense of landing and taking in cargo on freight, is payable by the vessel, unless expressly stipulated to the contrary in the bills of lading, or by special contract.

Hard Spanish Dollars should be expressed in contracts for freight, when that coin is bargained for; and the vague expression of $ must be avoided, as it leads to many disputes.

No vessel should be chartered to this place, having less than *thirty working lay-days, exclusive of Sundays and holy-*

days, and those carrying 1000 barrels or upwards should in no case have less than 60 lay-days.

500 hides of 28 lbs. each, purchased here, cost on board Reis 2277,795, which amount, with $2\frac{1}{2}$ per cent. commission for endorsing and negotiating the bill, was drawn for on London at 50*d.* for 1000 Reis. The remittance from the United States to meet this sum being made, when bills on London were at $\$4\frac{89}{100}$ per £. Required the actual cost in the United States of the hides per lb. on board at Rio Janeiro. Ans. 17 cents.

ARBITRATION OF EXCHANGE.

When the rates of exchange between several countries in succession are given, to find the rate of exchange between the first and last place in the correspondence.

Rule. Find by proportion the value of the sum originally remitted in the different moneys of the countries through which it passes according to the rates of the different exchanges, and so proceed till the whole is finished. Or,

Multiply all the first terms of the different statings together for a divisor, and the second terms, together with the sum remitted, for a dividend, and the quotient is the amount received in the denomination of the last place in the correspondence; from this result the rate of exchange is readily found by proportion.

Examples.

1. A merchant in London has credit for 500 piastres in Leghorn for which he can draw directly at 52*d.* sterling per piastre, but choosing to have it remitted by a circular rout, they are sent, by his order, to Venice at 95 piastres for 100 ducats banco; from thence to Cadiz at 350 maravadies per ducat banco; from thence to Lisbon at 630 reas per piastre of 272 maravadies; from thence to Amsterdam at 48*d.* Flemish for 400 reas; from thence to Paris at 54*d.* Flemish per crown; and from thence to London at 30*d.* sterling per crown: What is the arbitrated price between London and

Leghorn per piastre, and what is gained or lost by this circular remittance, without reckoning expenses?

piast.		*d. ban.*		*piast.*		*d. ban.*	
95	:	100	: :	500	:	$526\frac{6}{19}$	in Venice.
d.b.		*mar.*		*d.b.*		*mar.*	
1	:	350	: :	$526\frac{6}{19}$	:	$184210\frac{1}{19}$	in Cadiz.
mar.		*reas.*		*mar.*		*reas.*	
272	:	630	: :	$184210\frac{1}{19}$	:	426664	in Lisbon.
reas.		*d. fl.*		*reas.*		*d. fl.*	
400	:	48	: :	426664	:	$51199\frac{1}{2}$	in Amsterdam.
d. fl.		*cr.*		*d. fl.*		*cr.*	
54	:	1	: :	$51199\frac{1}{2}$	:	$948\frac{5}{38}$	in Paris.
cr.		*d. st.*		*cr.*		£. *s.* *d.*	
1	:	30	: :	$948\frac{5}{38}$	:	118 10 $4\frac{1}{2}$	sterling.

By the Chain Rule.

Antecedents.		*Consequents.*
		500 Piastres.
95 Piastres	=	100 Ducats.
1 Ducat	=	350 Maravadies.
272 Maravadies	=	630 Reas.
400 Reas	=	48 *d.* Flemish.
54 *d.* Flemish	=	1 Crown.
1 Crown	=	30 *d.* Sterling.

Product of Consequents = 15876000000

" Antecedents = 58814400 = £118 10 $4\frac{1}{2}$

The calculation may be abridged by omitting such antecedents and consequents as are alike, and reducing such as admit of a common measure, to the lowest term, as in vulgar fractions. The demand may be placed at the bottom instead of the top, as above: The result would be the same.

	£.	*s.*	*d.*
Amount received by circular remittance	118	10	$4\frac{1}{2}$
500 piastres at 52*d.*	108	6	8
Ans. { Gained by circular remittance	£10	3	$8\frac{1}{2}$
Arbitrated value of a piastre by ditto	$56\frac{1777}{2000}$ *d.*		

"It is very easy to fancy problems and theories in Compound Arbitration, where great advantages might be made by numerous combinations of exchange, but seldom does any opportunity occur in practice of realizing such speculations. On the contrary, men of experience are satisfied with combining the exchanges of three places only, and there are few instances of the kind that will not afford room for a reasonable profit."

AMERICAN DUTIES

Are calculated as in the following

Examples.

1. What is the duty on 2 hhds. of brown Sugar, weighing gross 2425 lbs. draft 7 lb. per hhd. tare 12 per cent. and duty 3 cents per lb.?

2425
2×7= 14 draft.
2411
12 per ct. = 289 tare.
2122 net.
3
Ans. $63,66 cts.

2. What is the duty on 2 bags Havana Sugar, weighing 285 lb. gross, draft ½ per cent. tare 2 per cent. and duty 5 cents per lb.?

285
½ per ct. = 1 draft.
284
2 per ct. 6 tare.
278 net.
5
Ans. $13,90

3. What is the duty on 6 puncheons of Rum, containing, viz.

709 gals.
wants 27

682
Allowed for leakage 14 or 2 per cent.

668 net at 42 cts. $280,56 for duty.

Deduct if exported.
3 per cent. of the duties $8,42
2 cents on each gallon 13,36
21,78

$258,78 for drawback.

Tares allowed at the Custom-House.

On Sugar, in boxes, 15 per cent.; in casks, 12 per cent.; in bags or mats, 5 per cent.—Coffee, in casks, 12; in bags, 2; and in bales, 3 per cent.—Cotton, in bales, 2; and in zeroons, 6 per cent.—Cocoa, in casks, 10; and in bags, 1 per cent.—Pepper, in casks, 12; in bales, 5; and in bags 2 per cent.—Green Teas, 20 lb. per chest; Souchong, over 100 wt. 22 lb. per chest; Bohea, whole chest, 70 lb.; half do. 36 lb.; quarter do. 22 lb.—Leakage on Spirits 2 per cent.

The mode of estimating ad valorem rates of duty.

The ad valorem rates of duty, upon goods, wares and merchandises, at the place of importation, shall be estimated by adding 20 per cent. to the actual cost thereof, if imported from the Cape of Good Hope, or from any other place beyond the same, and 10 per cent. on the actual cost thereof, if imported from any other place or country, including all charges; commissions, outside packages and insurance excepted.—(*See Laws of the United States.*)

"The fluctuating value of Exchange on London at the time and place of shipment, is the standard which the Treasury and Collectors take for most of the moneys, not rated specifically by law.—In entering goods at the Custom House, the value of each package should be put *separately* in the Entry; and at the short price. If there was any discount allowed to the owner, in payment made for the same before their shipment, and the true value, if the owner is the manufacturer in whole or in part, without any discount."

4. What is the duty on one bale of Linen Diapers from St. Petersburg, the cost there being 710 Rubles 50 Copecs, each at 10½*d.* sterling duty at 15 per cent.?

Ans. $22,77 cts

5. How much is the duty on one bale of Cloth from Bremen, which cost 400 Rix dollars, at 75 cents each, the duty at 25 per cent.? Ans. $82,50 cts.

6. Three Cases of goods from Paris cost, viz.

1 Case Levantines		francs 1200,00
1 "	Artificial Flowers, Essences, &c.	600,30
1 "	Watches, Jewelry, &c.	2500,75

The duty on Watches, &c. is 7½, on Silks, &c. 15, and on Flowers, &c. 30 per cent.?

Required the amount of duty.

		$	$
Cost of Watches, &c. fs. 2500,75 at 18¾ cts.		468,89	
	10 per ct.	46,89	
		$515,78 at 7½ per ct.	38,68
Cost of Silks, &c. fs. 1200,00 "		$225,00	
	10 per ct.	22,50	
		247,50 at 15 per ct.	37,12½
Cost of Flowers, &c. fs. 600,30 "		$112,55	
	10 per ct.	11,25	
		$123,80 at 30 per ct.	37,14
		Amount of Duties	$112,94½

7. What is the duty on 10 Cases of Silk, invoiced at Sa. Rs. 5610 14 2, Rs. at 50 cts. each, and duty at 15 per cent.? Ans. $504,98 cts.

8. What is the duty on 100 bags Salt Petre, cost Sa. Rs. 2015 12 5, at 7½ per cent.? Ans. $90,71.

9. Required the duty on 3 Camel's hair Shawls, cost Sa. Rs. 1050, at 25 per cent. Ans. $157,50.

10. Required the duty on 15 Cases of Paper from Leghorn, cost Pezzas 926 18 10, the pezza at 90 cents, and duty 30 per cent. Ans. £275,30.

Bonds.	*Debentures.*
$91,30	$89,42
92,00	89,00
92,00	90,00
$275,30 Duty.	$268,42 Drawback.

11. Three Cases of goods of the following amount were imported from Liverpool, on the 1st of January, viz.

3.	One Case	Bombasin cost ster.	£63	8	7	duty 15	per ct.
10.	"	" Calicoes cost	54	7	6	" 25	"
7.	"	" Metal Buttons cost	40	8	4	" 20	"

Required the amount of duties and drawback valuing the £ ster. at $4,44 cts. Ans. $152,34 for Duty.
$152,34 less 2½ per ct.* 148,53 for Debentures.

Bonds.				*Debentures.*			
1	Bond due	1st. Sept.	$50,34	1	payable	2d Sept.	$49,53
1	" "	1st. Nov.	51,00	1	"	2d Nov	49,00
1	" "	1st. Jan.	51,00	1	"	2d Jan.	50,00
			$152,34				$148,53

TABLES of the value of the Gold Coins of Great Britain, France and Spain, according to the Act of Congress of April 29, 1816.

Great Britain and Portugal.					Gold Coins of France					Gold Coins of Spain.				
grs.	*cts.*	*dwt.*	*dlls.*	*cts.*	*grs.*	*cts.*	*dwt.*	*dlls.*	*cts.*	*grs.*	*cts.*	*dwt.*	*dlls.*	*cts.*
1	4	1	0	89	1	4	1	0	87	1	3	1	0	84
2	7	2	1	78	2	7	2	1	75	2	7	2	1	68
3	11	3	2	67	3	11	3	2	62	3	11	3	2	52
4	15	4	3	55	4	15	4	3	49	4	14	4	3	36
5	19	5	4	44	5	18	5	4	36	5	17	5	4	20
6	22	6	5	33	6	22	6	5	23	6	21	6	5	04
7	26	7	6	22	7	25	7	6	11	7	25	7	5	88
8	30	8	7	11	8	29	8	6	98	8	28	8	6	72
9	33	9	8	00	9	33	9	7	85	9	31	9	7	56
10	37	10	8	89	10	36	10	8	73	10	35	10	8	40
11	41	11	9	78	11	40	11	9	60	11	39	11	9	24
12	44	12	10	67	12	44	12	10	47	12	42	12	10	08
13	48	13	11	55	13	47	13	11	34	13	45	13	10	92
14	52	14	12	44	14	51	14	12	21	14	49	14	11	76
15	56	15	13	33	15	55	15	13	09	15	53	15	12	60
16	59	16	14	22	16	58	16	13	96	16	56	16	13	44
17	63	17	15	11	17	62	17	14	83	17	59	17	14	28
18	67	18	16	00	18	65	18	15	71	18	63	18	15	12
19	70	19	16	89	19	69	19	16	58	19	67	19	15	96
21	74	20	17	78	20	73	20	17	45	20	70	20	16	80
22	78				21	76				21	73			
23	85				22	80				22	77			
					23	83				23	81			

* Allowed by law to be retained, but no drawback is allowed on duties of a less sum than $50.

A

PRACTICAL SYSTEM

OF

MENSURATION AND GAUGING.

BY MICHAEL WELSH.

Boston:
PUBLISHED BY RICHARDSON AND LORD.
No. 133, Washington Street.

1828.

DISTRICT OF MASSACHUSETTS—TO WIT:

District Clerk's Office.

BE IT REMEMBERED, That on the twenty-seventh day of September, A. D. 1826, in the fifty-first year of the Independence of the United States of America, MICHAEL WALSH, of the said District, has deposited in this Office the Title of a Book, the Right whereof he claims as Proprietor, in the words following, to wit:

"A Practical System of Mensuration and Gauging, by Michael Walsh."

In conformity to the Act of the Congress of the United States, entitled, "An Act for the Encouragement of Learning, by securing the Copies of Maps, Charts and Books, to the Authors and Proprietors of such copies, during the times therein mentioned:" and also to an Act entitled, "An Act supplementary to an Act, entitled, An Act for the encouragement of Learning, by securing the copies of Maps, Charts and Books, to the Authors and Proprietors of such copies during the times therein mentioned; and extending the benefits thereof to the Arts of Designing, Engraving and Etching Historical and other Prints."

JOHN W. DAVIS,
Clerk of the District of Massachusetts.

MENSURATION.

BOARD AND TIMBER MEASURE.

When the length of a board or plank is in feet, and the width in feet, multiply them for the content in feet.

When the length is in feet, and the width in inches, multiply the length by the width, and divide the product by 12 for feet.

When the length of timber or joist is in feet, and the side or sides in inches, multiply the *product* of the sides by the length, and divide by 12 for feet, board measure, or by 144 for solid or cubic feet.—If the length be taken in inches, divide by 1728 for cubic feet.

EXAMPLES.

1. In a board or plank 19 feet long, and 2 feet wide, how many feet? Ans. 38 feet.

2. In a board or plank 23 feet long and 17 inches wide, how many feet?

```
 23
 17
---
161
 23
---
12)391
---
 32  7   Ans. 32 feet 7 inches.
```

3. How many feet in a joist, 8 inches square and 60 feet long?

```
8×8=64/12=5  4          or  8
                             8
      30                    --
     ---                    64
     150                    30
4=1/3 10                   ----
     ---                 12)1920
     160                 ------
     ---                 12)160   Ans. 160 ft. board measure.
                         ------
                          13  4   or 13 ft. 4 inches solid
                                     measure.
```

4. What is the content of a piece of timber, 40 feet long and the sides 18 by 21 inches?

		ft.	in.	
18	or	40	0	at 12 inches.
21		20	0	6 "
—		—	—	"
18		60	0	12 "
36		30	0	6 "
—		15	0	3 "
378		—		
40	Cubic feet	105	0	
—		12		
12)15120		—		
—		1260 as before.		

12)1260 feet B. M. or of Ranging timber.

Ans. 105 cubic feet.

5. What is the content in board measure of a joist 25 feet long, and 4 by 3 inches?

4×3=12 inches or one foot, 25×1=25. ft the answer. In this case the length is the content.

6. How many cubic feet in a stone, 10½ feet long, 5 feet 3 inches wide, and 1 foot 9 inches thick?

5 3=63 inches	by Duodecimals	by the quarter girt
1 9=21	10 6	126 inches
—	5 3	42 "
63	—	—
126	52 6	4)168
—	2 7½ for 3 in.	—
1323	—	42×42=1764
10½ feet	55 1½	10½
—	27 6¾ for 6 in.	—
13230	13 9¼ for 3 in.	17640
661	—	882
—	96 5½	—
12)13891	—	12)18522
—		—
12)1157 7		12)1543 6
—		—
Ans. 96 5½		Feet 128 7½

True content 96 ft. 5½ inches

False content 128 7½, being 32 feet too much.

7. Required the superficial feet in the following lot of boards, viz.

length.	*width.*	*feet.*	*inches.*
20 feet	9 inches	15	0
40 . .	6 . . .	20	0
36 . .	12 . . .	36	0
30 . .	15 . . .	37	6
15 . .	18 . . .	22	6

8. Required the content of the following pieces of timber in board measure, the length and side of the square being given.

length.	*square.*	*feet.*	*inches.*
30 feet	8 inches . .	160	0
30 . .	9 . . .	202	6
30 . .	23 . . .	1322	6
28 . .	16 . . .	597	4

9. Required the solid content, or cubic feet in the following pieces.

length.	*breadth. depth.*	*cubic ft.*	*inches.*
7 feet 5 inches	41 by 29 inches	Ans. 61	2
24 " . .	18 by 14 " .	42	0
30 " . .	18 by 15 " .	56	3
9 " . .	45 by 13 " .	36	$6\frac{3}{4}$

10. How many cubic feet in 4 stones, measuring, viz.

length.		*cubic ft.*	*inches.*
10 feet	21 by 18 inches . .	26	3
10 " . .	22 by 15 " . .	22	11
$4\frac{1}{2}$ . .	35 by $16\frac{1}{2}$ " . .	18	0
$9\frac{1}{2}$ . .	19 by $12\frac{1}{2}$ " . .	15	8

ROUND TIMBER.

To find how much round timber will square to. Multiply the girt by ,225, or multiply the diameter by ,7, or ,71.

To find the girt or circumference by the diameter. Say—As 1 is to 3,14159 or 3,14 or as 7 to 22, so is the diameter to the girt, and the reverse to find the diameter from the circumference.

To find the quarter girt, take $\frac{1}{4}$ of the circumference. Deducting $\frac{1}{8}$ from the diameter will also give the quarter girt, nearly.

EXAMPLE.

1. Suppose a round stick to be 24 inches diameter, How much will it square to? Ans. 17 inches.
" " is the girt . . . . . 75$\frac{1}{3}$ "
" " the quarter girt . . . . . 18$\frac{5}{6}$ "

Round timber loses almost $\frac{1}{3}$ of its solidity by being squared, and the quarter girt makes about $\frac{1}{4}$ more than the side of the square would. The solid content being to that by the quarter girt as 9 to 7, and to the content, if squared, as 30 to 19.

To find the Cubic Feet in Round Timber.

RULE. Multiply the square of the girt by the length, from the product reject two figures to the right, and divide the remaining figures by 18, or more concisely by 3, and then by 6 for cubic feet. If by custom or agreement the quarter girt is taken, multiply the square of it by the length in feet, and divide by 144 for the content in Cubic feet.

EXAMPLES.

1. Required the content of a round log, the girt of which is 80 inches, and the length 26 feet.

by the girt		quarter=20 inches		80×,225=18 in. for side of the [square.
80		20		18
6400		400		144
26 feet		26 feet		18
38400		12)10400		324
12800				26 feet
		12)866,8		
3)1664,00		C. F. 72,2$\frac{3}{4}$ by $\frac{1}{4}$ girt.		12)8424
6)554				12)702
Ans. 92 feet.				C. F. 58,6 if squared.

2. Required the contents of the following pieces of round timber, viz.

length.	*girt.*	*solid content by $\frac{1}{4}$ girt if sq.*		Cubic ft.
20 feet	48 inches	Ans. 25$\frac{1}{2}$	feet 20	. 16$\frac{1}{4}$
28 "	52 "	42	" 32	. 27
25 "	60 "	50	" 39	. 31$\frac{1}{2}$
24 "	70 "	65	" 51	. 41
30 "	52 the mean of 5 diff. places	45	" 35	. 28$\frac{1}{2}$
20 "	the diameter being 24 inches	62$\frac{1}{2}$	" 49	. 40

Suppose the six pieces, last mentioned, were pine logs, brought by A to a saw-mill, and when measured at the quar-

ter girt, he sold them at $9 per thousand: Allowing as usual, 115 feet to make a thousand feet of boards, and deducting one fourth for sawing, What was the amount?

115 : 1000 : : 226 the contents as before.
1000

115)226000

1965 feet of boards.

1965		Or, 1965	
9 mills.		¼ = 491	deducted.
17685		1474	feet.
¼ 4421		9	mills.
Amount $13,26,4		$13,26,6	

8. Required the difference in the solid contents of the two following pieces of timber, equal in length and circumference, viz.

One *round* piece, 24 feet long, and 60 inches in circumference. The other piece 24 feet long, 18 inches wide and 12 inches thick.

Ans. 12 feet, the first being 48, and the other 36 Cubic ft.

This *difference* accounts for the custom in N. England of paying one third *more* for the hauling round timber from the forests to the ship-yards, than for that which is rough-hewn; each being taken there at the quarter-girt.

RULES FOR PILLARS.

1. Multiply the square of ⅓ of the girt by twice the length in feet, and divide by 144 for the content.

2. Multiply ⅓ of the circumference by ½ the diameter, and the product by the length in feet, and divide the last product by 144 for the answer.

3. Multiply the square of the diameter by the length in feet, and that product by 11 and then divide by 14 for the solid content in feet.

EXAMPLE.

Required the content in cubic feet of a pillar, the diameter of which is 30 inches, equal to 94 inches girt and the length 24 feet.

1st method.	*2d.*	*3d.*
$\frac{1}{5}$ of 94 = $18\frac{4}{5}$	$\frac{1}{2}$ of 94 = 47	diam. $2\frac{1}{2} \times 2\frac{1}{2} = 6\frac{1}{4}$ ft.
$18\frac{4}{5}$	$\frac{1}{2}$ of 30 = 15	24
353	705	150
24×2=48	24	11
12)16944	12)16920	14)1650
12)1412	12)1410	117 10
117 8	117 6	

To find the content of round or unsquared timber, whose ends or bases are unequal in circumference.

RULE. To the products of the girts of the two bases, add $\frac{1}{3}$ of the square of the difference, the sum will be the square of the mean girt, then proceed as before.

EXAMPLE.

Requirer the solidity of a mast, the length of which is 72 feet and the girt at one end is 57 inches, and at the other 38 inches.

57×38= 2166
38

19×19=361÷3= 120

2286
72

4572
16002

3)1645,92

6)548

Ans. 91 feet.

CIRCLES.

To find the area of a circle from its circumference. Multiply its square by ,07958. And to find its area by the diameter, multiply its square by ,7854.

To find the side of a square equal to any given superficies.

Rule. The square root of the given area, is the side required.

If the diameters of circles be as 1 to 2, the circumferences will be in the same proportion. But the areas of the same circles will be as 1 to 4, or as the squares of their diameters. Therefore, while the circumference is twice as large, the area is four times as much.

SPHERES OR GLOBES.

The superficies of every sphere or globe is equal to four times the area of its greatest circle. Multiplying its diameter by its circumference will also give its convex surface.

To find the solidity of a Sphere or Globe.

Multiply the cube of its axis by ,5236.

Spheres are to each other as the cubes of their diameters; and their surfaces as the squares of their diameters.

GAUGING.

Gauging teaches to find the content of any vessel by having the proper dimensions given, which are usually taken in inches and tenths of an inch.

An Ale gallon contains	. .	282 Cubic inches.
A Wine gallon	. . .	231
Bushel	. . . .	2150,42
Cubic Foot	. . . .	1728

The Ale gallon is to the Wine gallon as 58 to 71 nearly.

Problem I.

To find the content in Ale or Wine gallons, &c. of a box, chest, or cistern.

Rule. Multiply the length, breadth, and depth together, and divide the last product by the cubic inches in a gallon or bushel, and the quotient will be the answer required.

Examples.

1. Required the content in ale gallons, of a square vessel, the sides of which are 80 inches and the depth 20 inches?

$80\times80=6400\times20=128000\div282=454$ Ale Gallons.

2. How many bushels in a cistern 8 feet long, 4 feet wide, and 4 feet deep, equal to a cord, wood measure?

$96\times48\times48=221184$ cubic inches, and divided by 2150,42, the cubic inches in a bushel, give $102\frac{4}{5}$ *even* bushels.*

Or thus,

8 feet $\times$ 4 $\times$ 4 (Cubic foot) = 128

One bushel = $1\frac{1}{4}$ = 4

5)512

$102\frac{4}{5}$ *even* bushels.

Problem II.

To find the contents of a vessel in form of a part of a pyramid.

Rule. Multiply the sides of the two bases together, and to the product add $\frac{1}{3}$ of the square of their difference; then multiply the sum by the height, and divide the product by the cubic inches in the measure required.

Example.

Required the contents in wine gallons of a vessel in form of a part of a pyramid that has the sides of the base 96

* The difference between *heaped* and *even* bushels, in measuring loads of charcoal, does not appear to be fixed.

inches, and the sides at the top 68 inches, and the height 81 inches ?

$96 \times 68 = 6528$ $\quad$ 96

$261\frac{1}{3}$ $\quad$ 68

$6789\frac{1}{3}$ $\quad$ 28

81 $\quad$ 28

6789 $\quad$ $\frac{1}{3})784$

54312

27 $\quad$ $261\frac{1}{3}$

231)549936

Ans. 2380,6 W. Gs.

2150,42)549936

Equal to 2,55,7 Bushels.

As the area of a circle whose diameter is 1 inch, is ,7854 decimal parts of an inch, if the contents of a gallon or bushel be divided by ,7854 the quotient will be the proper divisor for the square of any diameter, to reduce the cubic inches into gallons or bushels, and the square root of this divisor is also the gauge point, and the fixed multipliers, which answer the same purpose, are found by dividing ,7854 by the contents of the gallon, bushel, cubic foot, or any other measure, the quotient being the multiplier required. Thus,

Divisor.	Dividend.		For fixed Divisors.		
,7854	282	Quotient	359,05	Gauge point	18,95 for Ale gals.
,7854	231	. . .	294,12	. . . . .	17,15 " Wine.
,7854	2150,42	. . .	2738	. . . . .	52,32 " Bushels.
,7854	1728	. . .	2200	. . . . .	46,9 " Cubic ft.

	Divisor.	Dividend	Fixed Multipliers.	
Ale gallon	282 C. In.	,7854	the quotient is	,002785 for Ale gals.
Wine	231	,7854	. . . . .	,0034 " Wine.
Bushel	2150,42	,7854	. . . . .	,000365 " Bushels.
Cubic ft.	1728	,7854	. . . . .	,000454 " Cubic ft.

Problem III.

To find the content of a cylinder in Gallons, &c.

Rule. Multiply the square of the diameter by the length, and then multiply or divide by the proper numbers.

EXAMPLES.

1. Required the content in wine gallons of a cylinder, the diameter of which is 42,5 inches, and its length 31,5 inches?

$42{,}5 \times 42{,}5 = 1806{,}25$

$31\frac{1}{2}$

56896,87

,0034

193,449358 Ans. $193\frac{1}{2}$ W. Gals.

Or thus: 294)56896

$193\frac{1}{2}$ gallons, as before.

For Ale gallons, $\frac{5689}{359} = 158{,}5$ gallons.

2. The tube of Dr. Herschel's great telescope is forty feet in length and five feet in diameter,* Required the contents in wine gallons of a cylinder of equal dimensions.

$60 \times 60 = 3600$

480

1728000

,0034

5875,2000 Ans. 5875 W. Gallons.

3. What is the content in English bushels of a measure in form of a cylinder, the diameter of which is 19 inches and the height $17\frac{1}{2}$ inches?

$19 \times 19 = 361$

$17\frac{1}{2}$

2527

361

180

6317

,000365

31585

37902

18951

Bushels 2,305705

Or,

2738)6317(2,3

5476

841,0

8214

196

Ans. 2,3 bushels.

* Silliman.

4, Suppose a round tub to be 45 inches diameter, and one inch deep, what is its content in ale gallons?

$$45\times45=2025$$

$$\frac{}{359}=5{,}64 \text{ gallons.}$$

If the square of the diameter of any circle be multiplied by ,7854 the product is the area.

EXAMPLE.

If the diameter of a circle be 45 inches, what is the area?

$$45\times45=2025\times,7854=1590 \text{ inches,}$$

and at one inch deep the content or capacity would be 1590 inches, which when divided by 282 would give

5,63 Ale gallons, nearly, as before.

PROBLEM IV.

To find the content of a cask or round vessel, that is straight staved and wider at one end than at the other.

RULE. To the product of the two diameters, add $\frac{1}{3}$ of the square of their difference, then multiply the sum by the length, this product multiplied by the proper factor, or divided by the divisor, will give the content required.

EXAMPLE.

Required the content in wine gallons of a round vessel, the bottom of which is 38, the top 20,2 inches diameter, and the length 21 inches.

$38\times20,2=767,6$	38
105,6	20,2
873,2	17,8
21	17,8
18337,2	$\frac{1}{3}$)316,84
,0034	
	105,61
62,34648	Ans. 62 Wine Gallons.

359)18337 (51 Ale gallons.
1795

387
359

28

Problem V.

To find the content of a cask, having the bung and head diameters, and the length given.

Rule. Multiply the difference between the head and bung diameters by ,68, ,67, ,64, ,62, or ,55 or such number as belongs to the form of the cask, add the product to the head diameter, and the sum will be the mean diameter, and then proceed as for a cylinder.

Example.

Given the bung diameter 28 inches, the head 20, and the length 40 inches. Required the contents, using ,68 for a multiplier, as the cask was full on the quarter.

28 20
20 5,44
—— ——
8 25,44×25,44=647,1936
,68 ——————
—— 647,2×40=25888
5,44 ,0034

103552 Ans. 88 Wine gallons.
77664

88,0192 " 72 Ale gallons."

It is not so much the difference between the head and bung diameters, as the curvature of the cask that is to be regarded in choosing a multiplier. The greater the curvature, the greater should be the multiplier, and the nearer it is to a straight staved form, the less will be the multiplier. But by a little practice a person can tell at sight of a cask, what multiplier is to be used to find the contents.

To gauge a cask by means of the line of numbers on Gunter's scale, or on the callipers used by gaugers.

Rule. Extend from 1 towards the left hand to the number chosen as a multiplier, that extent will reach from the difference between the bung and head diameters to a number which, being added to the head diameter, will give the mean diameter, that is, will reduce the cask to a cylinder.

Then put one foot of the compasses upon the gauge point for the name required, and extend the other to the mean diameter, this extent turned over twice the same way from the length of the cask, will give the contents.

In the preceding example the extent from 1 to ,68, will reach from 8 to 5,44, which added to 20, gives 25,44 for the mean diameter. Then the extent from 17,15, the gauge point for wine gallons, turned over twice from the length 40, will reach to 88 gallons.

The same case on the Sliding Rule, using ,7 as a multiplier. Set 1 on the sliding line against ,7, and against 8 on it is 5,6 which added to 20 inches gives 25,6 for the mean diameter. Then set 17,15, the gauge point on the slide, against 15,1 and then against 40 on the slide line is 59,7, and against 59,7 on the slide, is 89,2, the contents in wine gallons.

Dimensions of Casks, the contents of which are to be found by the preceding rules.

head.	*bung.*	*length.*	*multiplier.*	*M. D.*	*contents.* Wine gals.
27,6	Inches 33,6	38	,67	31,62	129
25,6	33,8	52	,64	30,85	169
25,1	27,2	30	,6	26,36	70
30,7	34,5	59	,62*	33,1	219
23	26,5	28	,68	25,4	62
23	26,5	28	,5	24,75	59
24,5	31,5	42	,7	29,4	123
24,5	31,5	42	,64*	28,98	120
24,5	31,5	42	,52	28,14	113
24,5	31,5	42	,57	28,49	116
					Ale gals.
24,5	as before	”	,7	29,4	101
24,5	” ”	”	,65	29,05	98,7
24,5	” ”	”	,6	28,7	96
24,5	” ”	”	,55	28,35	94

* 62 and 64 are the numbers generally used.

A

NEW SYSTEM

OF

PRACTICAL BOOK-KEEPING:

IN WHICH

THE VARIOUS METHODS OF THAT USEFUL ART

ARE CONCISELY EXPLAINED

BY MICHAEL WALSH.

When a youth has acquired a readiness in writing and arithmetic he may learn the beautiful and useful art of Book-Keeping according to the Italian method.——

Every body must allow that nothing is likelier to keep a man within compass, than having constantly before his eyes the state of his business.

Locke on Education.

Boston:

PUBLISHED BY RICHARDSON AND LORD.

No. 133, Washington Street.

1828.

DISTRICT OF MASSACHUSETTS, *to wit*:

District Clerk's Office.

BE IT REMEMBERED, That on this 27th day of September, A. D. 1826, in the fifty-first year of the Independence of the United States of America, MICHAEL WALSH, of the said district has deposited in this Office, the Title of a Book the right whereof he claims as Author, in the words following, *to wit:*

"A New System of Practical Book-Keeping, in which the various methods of that useful Art are concisely explained. By Michael Walsh.

"When a youth has acquired a readiness in writing and numbers, he may learn the beautiful and useful art of Book-Keeping, according to the Italian method.——

"Every body must allow that nothing is likelier to keep a man within compass than having constantly before his eyes the state of his business. *Locke on Education.*"

In conformity to the Act of the Congress of the United States, entitled, "An Act for the encouragement of Learning, by securing the copies of Maps, Charts and Books, to the Authors and Proprietors of such copies, during the times therein mentioned:" and also to an Act entitled, "An Act supplementary to an Act, entitled, An Act for the encouragement of Learning, by securing the Copies of Maps, Charts and Books, to the Authors and Proprietors of such Copies during the times therein mentioned; and extending the benefits thereof to the Arts of Designing, Engraving and Etching Historical and other Prints."

JOHN W. DAVIS, *Clerk of the District of Massachusetts.*

BOOK-KEEPING.

Book-Keeping is the art of recording the transactions of trade in a regular manner.

Books may be kept by Single or Double Entry.

Single Entry is used in retail business.

Double Entry is used in wholesale and mercantile affairs.

In order to this, three books are required, viz. the Waste-Book, Journal and Ledger, and others, called auxiliary books, are necessary in extensive business.

The Waste Book contains the original entry of every transaction, the time and circumstances of which should be stated in a clear and regular manner.

In teaching, a narrative of the business is given in the Waste Book, and transferred into the Journal; but in actual business, the Journal entries are collected from subsidary books, the titles of which are indicative of their uses, as Invoice Book, Sales Book, Charges, &c. In Kelly's system, there is a regular history of the business (thus collected) in the Waste Book to his third set, and this gives to that work a decided preference to any other British publication on the subject. It would be well, if, in every business, wherein arrangement is requisite, a plain, connected narrative of the daily transactions was kept, referring to subsidary books, or proper vouchers, if necessary. *We should then seldom hear* of that difficulty in adjusting the accounts of traders, shipmasters, and others, which leads to disagreement between parties, and often to tedious and expensive litigation. Nor can the arbitration of friends, or Courts of Justice effect a *satisfactory* settlement, without the requisite items or vouchers.

The Journal is an abstract of the Waste Book with a formal statement of Debtor and Creditor in order to transfer the several cases with more ease to the Leger.

The Leger is a register of all the transactions of the business, disposed in such order, that those belonging to every different subject, are brought together in one place, which is called the separate folio allotted to it.

In the Leger, every account is to be kept in Debtor and Creditor, and has allotted to it an equal portion of the left and right pages of one folio or opening. The left serving for the Debtor, and the right for the Creditor.

On the debit side, the Title is written with the letters *Dr.* after it, and on the opposite side the word *Contra* is written, and *Cr.* after it.

Besides the columns for money, there is also a column near them, in which is written the number of the folio, where the account stands, which corresponds with that you are posting; and near the margin is the column for the date, and when the business is extensive, there is also a column near it, for the page of the Journal, whence each account is taken.

There is also belonging to the Leger, an alphabet, to serve as an Index: which in teaching, is commonly placed at the beginning of it, but in business it makes a separate book. In this are inserted the names of all accounts that are opened in the Leger, each placed under the letter which is its initial, and its page in the Leger against it. The Personal accounts are distinguished by the initial of the Surname of the party. Accounts of Partnership by that of the Firm, and the other accounts by their name or kind.

RULES FOR JOURNALIZING.

Whatever you receive . . . . . } is Dr.
Whatever is to be charged with any cost or expense
Whoever is to be charged with any debt, cost, expense, or acceptance . . . . . }

Whatever is delivered by you, or ceases to be yours } is Cr.
On whatsoever account any thing is received, it
On whosoever's account any thing is received, he
Whosoever pays for himself, or is discharged, he
Whoever pays for you, or is accountable in your stead, ... he

Notes given, are termed . . Notes Payable.
Notes received, " . . . Notes Receivable.

Bills of Exchange directly or indirectly in the Merchant's favour, are termed, . . . Bills Receivable.
Bills, when accepted by him, . . Bills Payable.

In cases where personal or real Drs. or Crs. are wanting, the deficiency is to be supplied by fictitious names.

The word *To* is the sign or mark of a Credit in a Journal entry, and if not expressed, is always understood, and to be supplied in posting.—When the same account is Dr. or Cr. alone in two or more transactions on the same day, it will save writing, and be equally plain, if they be put in one entry in the Journal. The method of abridging, even for a whole month is adopted by some of the best accountants, and this, with that of comprising the several kinds of goods under the title of *Merchandize*, includes all that may be termed *Modern Improvement* on the Italian method.—In cases where there are sundry Drs. and Crs. in one transaction, it is better for the learner to resolve or put them into two entries, that shall have but one of their terms complex.

EXAMPLES FOR JOURNALIZING.

WASTE BOOK.	JOURNAL.			
1. Bought Flour for Cash	Flour	Dr.	to	Cash.
2. Sold Flour for Cash	Cash	"	"	Flour.
3. Bought Iron for Flour	Iron	"	"	Flour.
4. Sold Iron for Salt	Salt	"	"	Iron.
5. Sold Salt for Wine	Wine	"	"	Salt.
6. Bought Coffee for Wine	Coffee	"	"	Wine.
7. Sold Wine to A on credit	A	"	"	Wine.
8. Received Cash from A in full	Cash	"	"	A.
9. Sold Wine to B on his note	Notes Receivable	"	"	Wine.
10. Received payment of B's note in Cash . .	Cash	"	"	Notes Receivable.
11. Bought Flour from D on my note	Flour	"	"	Notes Payable.
12. Paid B in Cash for my note	Notes Payable	"	"	Cash.
13. Lost a bank note of $5	Profit and Loss	"	"	Cash.
14. Received a wager of $5	Cash	"	"	Profit and Loss.
15. Paid for a year's interest on my note to G $2	Profit and Loss	"	"	Cash.
16. Received for a year's interest on C's note $2	Cash	"	"	Profit and Loss.

17	Bought of B. 20 barrels of Flour at $5,50 Paid in Cash, $55,00 Gave my note on demand for $55,00	Flour Dr. to Sundries For cost of 20 bbls. at $5,50 $110,00 To Cash 55,00 To Notes Payable 55,00
18	Sold G. 20 barrels of Flour, at $6,25. Received in Cash $45,00 8 bbls. of Oil, at $10 80,00	Sundries Drs. to Flour. Rec'd for 20 barrels, at $6,25 $125,00 Cash 45,00 Oil, for 8 bbls. at $10 80,00
19	Paid freight of 20 hhds. of Molasses received per Volant on consignment from J. J. $18,00	J. S's Sales Dr. to Cash Paid for freight $18,00
20	Received payment of a legacy $100.00	Cash Dr. to Stock. Received a legacy $100,00
21	Received from B. as apprentice fee with his son $100,00	Cash Dr. to Profit and Loss. Received an apprentice fee, $100,00
22	Accepted Capt. G's bill in favour of H. at 5 days for repairs on Schooner Jane at N.Orleans, for $100,00	Schooner Jane Dr. to Bills Payable. For acceptance of Capt. G's bill, $100,00
23	Shipped in the Louisiana for NewOrleans, consigned to H. on my account, viz. 9 barrels of Beef, at $9,00 $81,00 20 qtls. Fish at 2,00 40,00 Paid Charges 3,00 $124,00	Adventure per Louisiana Dr. to Sundries. To Beef, 9 bbls. at $9 81,00 To Fish, 20 qtls. at $2 40,00 To Cash, paid charges 3,00 $124,00

24	Received from H. of New Orleans an account Sales of my adventure per Louisiana. Net proceeds are $142,50	H. of New Orleans Dr. to Adv. per Louisiana. For net proceeds $142,50
25	Paid Capt. G's bill accepted 5th inst. for $100,00	Bills Payable Dr. to Cash. Paid for Capt. G's Bill. $100
26	Sold N. on his note at 90 days I. J's 20 hhds. Molasses, 1646 galls. at 30 cts. $493,80	Notes Receivable Dr. to J. J's Sales. Received N's note for 1646 gallons at 30 cts. $493,80
27	Paid my subscription to the sufferers by fire at A. $20	Stock Dr. to Cash. Paid for sufferers at A. $20
28	Paid my subscription to the Reading Room $5	Profit and Loss Dr. to Cash. Paid for Reading Room, $5
29	I have taken up my note of 15th ult. to B. on which he has allowed for discount, $2 Paid balance in cash, 98 $100	Notes Payable Dr. to Sundries. To Profit and Loss, Interest, or Discount for $2 To Cash paid the balance 98 $100
30	On offering N's note for discount, by desire of J. J. I have received in Cash, $486,40 Discount allowed on it 7,40	Sundries Drs. to Notes Receivable. For Payment of N's note, viz. Cash $486,40 J. J's Sales for discount 7,40 $493,80 or J. J's account. If the sales account was closed.

31	My note of $564 at 60 days, having been offered for discount at the B.B. Bank, I have received in Cash $558,08 Allowed for 60 days' discount 5,92	Sundries Drs. to Notes payable. Cash $558,08 Profit and loss for discount 5,92 $564,00
32	Paid J. J. for net proceeds his consignment per Volant, viz. Freight already charged, $18,00 Wharfage, Storage, advertising, &c. 7,75 Discount allowed to N. 7,40 Commission on $493,80 at 5 per ct. 24,69 Cash paid J. J. per receipt. 435,96	J. J's Sales Dr. to Sundries. For closing the account. To Charges on Merchandize $7,75 To Commission on $493,80 at 5 per ct. 24,69 To Cash paid J. J. per receipt 435,96 $468,40 Or Credit J. J's account for the net proceeds, and charge him with the payment.

RULES FOR POSTING.

The first thing to be done in posting, or transferring accounts, is to title the Leger, that is, to open an account for each of the Drs. and Crs. contained in the Journal entry, taking care not to make two titles alike, as an account is never opened twice, though it may be transferred for want of room; and, to prevent such repetition, (as well as for readily finding any account,) the title should be immediately marked in the alphabet.

Secondly. As all the entries in the Journal are double, you must be careful on making any person or thing Dr., immediately to write on the Cr. side of the person or thing referred to. In other words, when you write on the left side of an account, (as you always do in making the first charge,) you must immediately write on the contrary or right of another account, for the same amount, if there be but one Dr. and one Cr.; but if there be Sundries, you are to write on each for its respective amount.

In the following four cases, which includes all the variety that occurs in posting, the letters over the several Drs. and Crs. in the Journal entries, refer to the corresponding entry or place in the Leger.

Jan'y. 1.

[a]James Barton Dr. to Flour.[b]

For 30 barrels $6 per berrel.

Dr. James Barton.* Cr.

[a]Jan.	1	To Flour,† for															
		bs.	$														
		30,	6			180											

* When the Dr. and Cr. are on the same page, the word *Contra* is not used.

† In making a charge of goods by *Double Entry*, the name or kind is mentioned immediately after the word *To*, then the quantity, price, &c. But in Single Entry, the *quantity* is mentioned after *To*, then the kind, price, &c. of the article.

Dr.	Flour.	Cr.
	[b]Jan. 1 By James Barton lbs. 30, 6. $	180

Jan'y. 2.

[a] William Anson Dr. to Sundries.

[b] To Beef for 3 bbls. at $9,59, $28,50
[c] To Fish for 9 q'tls. at 2,50 22,50
51,00

Dr.	William Anson.	Cr.
[a]Jan. 2 To Sundries	51 00	

Dr.	Beef.	Cr.
	[b]Jan. 2 By William Anson, bls. 3, $9,50	28 50

Dr.	Fish.	Cr.
	[c]Jan. 2 By William Anson, bls. 9, $22,50	22 50

Jan'y. 3.

Sundries Drs. to [a]James Smith.

[a] Oil for 3 bbls. Sperm. $9,50.	$28,50	
Cash	56,50	
		85,00

Dr.	Oil.						Cr.					
[a]Jan. 3	To James Smith, 3 bbls. $9,50			28	50							

Dr.	Cash.						Cr.					
[b]Jan. 3	To Jas. Smith			56	50							

Dr.	James Smith.						Cr.					
						[c]Jan. 3	By Sundries.			85	00	

Jan'y. 4th.

Sundries Drs. to Sundries.

[a] Iron for 10 cwt. at $6,00	$60,00	
[b] Mackerel, 14 bbls. at $5,00	70,00	
		$130,00
[c] To Coffee, for 252 lb. at 25 cts.	$63,00	
[d] To Notes Payable for mine to James Long	67,00	

Dr.			Iron.				Cr.		
[a]Jan.	4	To Sundries, cwt. 10, $6.	60	00					

Dr.			Mackerel.				Cr.		
[b]Jan.		To Sundries, bbls. 14, $5,00	70	00					

Dr.					Coffee.			Cr.	
					[c]Jan.	4	By Sundries, lb. 252, at cts. 25.	63	00

Dr.					Notes Payable.			Cr.	
					[d]Jan.	4	By Sundries to James Long	67	00

In business, the complex entry of *Sundries* Drs. to *Sundries* is studiously avoided by accountants. It is introduced in this place merely to show the learner how such entries may be posted.

As precision is one of the leading features of Book-Keeping, and the room in a Leger being always precious, it is of much consequence to confine every posting to a single line.

The book-keeper, for his own convenience when he is posting, commonly marks all the accounts throughout a page of the Journal, with their different places in the Leger; and, as he posts each account, he makes a point with his pen in

the Journal column: By this method he is less liable to Error, and makes more despatch, than if he had to examine the alphabet for each as he wants to post it.

In arranging the accounts in the Leger the same order is observed as in the Journal, except where accounts of a particular class, which are often referred to at the same time, are contiguously placed, to save the trouble of frequently turning to the Index. This method of classing accounts of the same description is found very convenient in business, but in the theory of Book-keeping it is more obvious and regular to follow the order of the Journal.

TO MAKE A TRIAL BALANCE.

When every account is posted from the Journal into the Leger, and as they will be on opposite or contrary sides, it is evident that the sums of the Dr. side will equal that of the Cr. side. This Trial or Check is generally made on a separate paper, and it may be performed every day, week, month or year, according to the extent of the business. The Titles of the Leger accounts are written under each other, with Dr. to the left, and Cr. to the right. Annexed to each, on its proper side, is set down the sum of every Dr. and Cr. and both sides will agree if the work be right, as in the following example from the cases on posting.

Drs.			Crs.	
dollars.	cts.		dollars.	cts.
165	..	James Barton.	..	..
..	..	Flour	165	..
51	..	William Anson.	..	..
..	..	Beef	28	50
..	..	Fish	22	50
56	50	Cash	..	..
28	50	Oil	..	..
..	..	James Smith.	85	..
60	..	Iron	..	..
70	..	Mackerel	..	..
..	..	Coffee	63	..
..	..	Notes Payable . .	67	..
431	00		431	00

TO BALANCE THE LEGER.

When every transaction is entered into the Leger, and the work proved by a Trial Balance, the next thing is, to balance the Leger; that is, to make each account even through the whole book, in order to know the true state of your affairs. For this purpose, a new account is to be opened at the end by the Title of Balance. To the debit of this account will be brought all the money, goods and other property belonging to you, and also the debts due to you, and on the credit will appear the debts you owe. Thus you have at one view the net of your estate; and the Profit and Loss Account to which you bring all your commissions, gains, losses, expenses, &c. will show in like manner, your success in trade, since you began the present set of books; and by these two all the other accounts are balanced or made even.

In making the general balance, merchants seldom open a balance account in the Leger, but use a balance sheet, which is transcribed at the end of the Journal.

PARTNERSHIP ACCOUNTS.

It is thought that these are reducible to the same simple form, and are to be balanced in the same manner, as other individual accounts. Those who wish to attend more particularly to this part of Book-keeping, may consult Jackson's System, in which the Theory of Accounts is carried to great extent.

On partnership accounts, Mr. Booth, a merchant, formerly of New York, whose system is acknowledged in Great Britain to be the first English work illustrative of the modern Italian method, thus remarks: "After a long and intimate acquaintance with this subject, after investigating partnership accounts under every form, and viewing them in every light, in which folly and ignorance could well have placed them, I never saw any difficulty in stating the joint concerns of a company, but what originated in the mistaken notion of the parties themselves. If merchants will not be careful to proceed in a regular line at first setting out, and keep a plain, simple narrative of their daily transactions, it can be no wonder that they so frequently get bewildered."

WASTE BOOK.

Boston, January 1st, 1826.

*√	An inventory of Money, Goods, and Debts belonging to me A. B. and also what I owe:		
	I have in ready money, - -	$300,00	
	60 barrels of Flour, at $5,50 - -	330,00	
	50 quintals of Fish, at 2,00 - -	100,00	
	James Lamos' note due on demand -	40,00	
	Charles Hampden, of Northampton, owes on account - - - - - -	25,00	
			795 00
	1		
√	I owe as follows.		
	To Simon Hill, on my note on demand	$30,00	
	To ReubenBradley of Worcester, on account	20,00	
			50 00
	2		
√	Bought of Amos Grove 40 barrels of Mackerel at $4,50, and paid him viz.		
	20 Barrels of Flour at $6 - -	$120,00	
	Balance in Cash - - - - -	60,00	
			180 00
	3		
√	Sold William Richards 20 barrels of Flour at $6		
	Received in Cash - - - -	50,00	
	His note on demand for - - -	70,00	
			120 00
	4		
√	Paid Reuben Bradley in full - - -		20 00
	5		
√	Taken up my note to Simon Hill paying him viz.		
	4 barrels of Four, at $6 - - -	$24	
	Balance in Cash - - - -	6	
			30 00

*This mark shows that the account has been Journalized.

Boston, January 6th, 1826.

✓	Received from Charles Hampden, on account	15	00
	8		
✓	Shipped in the Ruby, Simon Gale, for Albany, and consigned to Amos Gilman, on my account, viz.		
	20 quintals Fish, at $2,50 - - - - $50		
	10 barrels No. 1 Mackerel 5,50 - - 55		
	Paid charges at Shipping - - - 5		
		100	00
	9		
✓	James Lamos having failed and compounded with his creditors, paying 50 per cent. I have given up his note and received - - - -	20	
	10		
✓	Sold Charles Dutton, on his note at 30 days, 10 barrels Flour at $6,50 - - - - -	65	00
	20		
✓	Received from Amos Gilman, of Albany, an Account sales of my Adventure per the Ruby, the net proceeds being - - - - -	130	00
	,,		
✓	Received from James Rice for my bill of $100 in his favour on Amos Gilman of Albany, at 5 days sight, on which I discounted 1 per cent. viz.		
	In Cash - - - - - - - $99		
	Discount on $100 at 1 per cent. - - 1		
		100	00
	23		
✓	Bought of Charles Dutton, of Plymouth, one half of his Schooner Caroline, paying him, viz.		
	Gave up his note for - - - $65		
	Gave my note for 90 days, for - - 300		
	Gave Balance in Cash - - - 85		
		450	00

Boston, January 24th, 1826.

✓	Received for relinquishing my purchase of Flour at Auction - - - - - -	50	00
	25		
✓	Received a legacy of - - - - -	50	00
	26		
✓	Paid my subscription to the B. H. Monument	5	00
	,,		
✓	Paid my subscription to the Reading Room -	5	00
	27		
✓	Sold Cyrus Bates of Concord 10 barrels of Mackerel at $5,50, to be paid in 30 days -	55	00
	28		
✓	Paid for repairs on Schooner Caroline, per bills Charles Dutton's part is - - - $30 My part - - - - - - - 30	60	00
	30		
✓	Paid for rent, taxes, &c.	20	00

JOURNAL.

Boston, January 1st, 1826.

	1	Sundries Drs. to Stock.			
1		Cash	$300		
1		Flour, for 60 barrels at $5,50 .	330		
2		Fish, for 50 qtls. at $2.00 . .	100		
2		Notes Receivable for James Lamos' on demand	40		
2		Charles Hampden, due on acccunt .	25		
				795	00
		——— 1 ———			
1		Stock Dr. to Sundries.			
	2	To Notes payable for mine to Simon Hill on demand	$30		
	2	To Reuben Bradley of Worcester .	20		
				50	00
		——— 2 ———			
3		Mackerel, Dr. to Sundries.			
		For cost of 40 bbls. at $4,50.			
	1	To Flour, for 20 bbls. at $6 . .	$120		
	1	To Cash	60		
				180	00
		——— 3 ———			
	1	Sundries Drs. to Flour.			
		For Sales of 20 bbls. at $6.			
1		Cash	$50		
2		Notes Receivable for William Richards'	70		
				120	00
		——— 4 ———			
1	2	Reuben Bradley Dr. to Cash.			
		Paid him in full.		20	00
		——— 5 ———			
2		Notes Payable Dr. to Sundries.			
		For payment of mine to Simon Hill.			
	1	To Flour, for 4 bbls. at $6 . .	$24		
	1	To Cash	6		
				30	00

Boston, January 6th, 1826.

1	2	Cash Dr. to Charles Hampden, rec'd on acct.	15	00
		8		
3		Adventure to Albany Dr. to Sundries. For amount per the Ruby.		
	2	To Fish, 20 qtls. at $2.50 . . . $50		
	3	To Mackerel, 10 bbls. No. 1, $5,50 . 55		
	1	To Cash, paid charges 5		
			110	00
		9		
	2	Sundries Drs. to Notes Receivable. For adjustment of James Lamos'.		
1		Cash $20		
4		Profit and Loss, abated . . . 20		
			40	00
		10		
2	1	Notes Receivable Dr. to Flour. Received Charles Dutton's at 30 days for 10 bbls. at $6,50	65	00
		20		
3	3	Amos Gilman Dr. to Adventure to Albany. For net proceeds of consignment per the Ruby	130	00
		"		
3	3	Bills Receivable Dr. to Amos Gilman. For my draft on him in favour of James Rice	100	00
		"		
	3	Sundries Drs. to Bills Receivable for payment of my bill on Amos Gilman.		
1		Cash $99		
4		Profit and Loss, for discount at 1 per cent. 1		
			109	00
		23		
3		Schooner Caroline, my half, Dr. to Sundries.		
	2	To notes Receivable given up to Charles Dutton's $65		
	2	To notes payable for mine to-him, . 300		
	1	To Cash 85		
			450	00

Boston, Jan. 24th, 1826.

1	4	Cash Dr. to Profit and Loss.		
		Received for my purchase of Flour at Auction	50	00
		25		
1	1	Cash Dr. to Stock.		
		Received a legacy	50	00
		26		
1	1	Stock Dr. to Cash.		
		Paid my subscription to the B. H. Monument	5	00
		"		
4	1	Profit and Loss Dr. to Cash.		
		Paid at the Reading Room . . .	5	00
		27		
4	3	Cyrus Bates Dr. to Mackerel.		
		For 10 bbls. at $5,50	55	00
		28		
	1	Sundries Drs. to Cash.		
		For payment of bills on the Caroline, viz.		
3		Schooner Caroline, my half, for . $30		
4		Charles Dutton, for his part . . 30		
			60	00
		30		
4	1	Profit and Loss Dr. to Cash.		
		Paid for Rent, Taxes, &c. . . .	20	00

The following Entries will be of use in making the general Balance and closing the Leger.

Boston, January 31st, 1826.

	4	Sundries Drs. to Profit and Loss.			
		For gain on the following Accounts.			
1		Flour	$32		
2		Fish	10		
3		Mackerel	20		
3		Adventure to Albany	20		
				82	00
		,,			
4	1	Profit and Loss Dr. to Stock.			
		For net gain		86	00
		,,			
4		Balance Dr. to Sundries.			
	1	To Cash remaining . . .	$318		
	1	To Flour, 6 bbls. at $5,50 . .	33		
	2	To Fish, 30 qtls. at $2 . . .	60		
	2	To Notes Receivable, William Richards'	70		
	2	To Charles Hampden . . .	10		
	3	To Mackerel, 20 bbls. at $4,50 .	90		
	3	To Amos Gilman	30		
	3	To Schooner Caroline . . .	480		
	4	To Cyrus Bates	55		
	4	To Charles Dutton . . .	30		
				1176	00
		,,			
2	4	Notes payable Dr. to Balance.			
		For amount of mine to Charles Dutton		300	00
		,,			
1	4	Stock Dr. to Balance.			
		For net Stock		876	00

ALPHABETICAL INDEX TO THE LEGER.

A		**G**	
Adventure to Albany	3	Gilman Amos - -	3
B		**H**	
Bradley Reuben -	2	Hampden Charles -	2
Bills Receivable -	3	**M**	
Bates Cyrus - -	4		
Balance - - -	4	Mackerel - -	3
C		**N**	
Cash - - -	1	Notes Receivable -	2
		Notes Payable - -	2
D		**P**	
Dutton Charles -	4	Profit and Loss -	4
F		**S**	
Flour - - -	1	Schooner Caroline -	3
Fish - - -	2	Stock - - -	1

Stock Dr.

1826		Cr.	
Jan. 1	To Sundries		50 00
26	To Cash	1	5 00
31	To Balance, for net stock	4	876 00
			931 00

Cash Dr.

1826			
Jan. 1	To Stock	1	300 00
3	To Flour	1	50 00
6	To Charles Hampden	2	15 00
9	To Notes Receivable	2	20 00
20	To Bills Receivable	3	99 00
24	To Profit and Loss	4	50 00
25	To Stock	1	50 00
			584 00

Flour Dr.

1826		bbls.		
Jan. 1	To Stock at $5,50 per bbl.	60	1	330 00
31	To Profit and Loss, gained		4	32 00
		60		362 00

Contra				Cr.	
1826			Dr.		
Jan. 1	By Sundries			795	00
25	By Cash		1	50	00
31	By Profit and Loss, for net gain* .		4	86	00
				931	00

Contra				Cr.	
1826					
Jan. 2	By Mackerel		3	60	00
4	By Reuben Bradley		2	20	00
5	By Notes Payable		2	6	00
8	By Adventure to Albany . .		3	5	00
23	By Schooner Caroline . . .		3	85	00
26	By Stock		1	5	00
"	By Profit and Loss . . .		4	5	00
28	By Sundries			60	00
30	By Profit and Loss . . .		4	20	00
31	By Balance Remaining . .		4	318	00
				584	00

Contra					Cr.	
1826				bbls.		
Jan. 2	By Mackerel at	$6	. .	20	3	120 00
3	By Sundries	6	. .	20		120 00
5	By Notes Payable	6	. .	4	2	24 00
10	By Notes Receivable	6,50	.	10	2	65 00
31	By Balance	5,50	.	6	4	33 00
				60		362 00

* If the legacy and B. H. M. subscription were carried to the Profit and Loss account, the gain would *seem* to be $131, which would be $45 *more* than the *true gain* by trade.

Fish Dr.

1826		qtls.	Cr.		
Jan. 1	To Stock at $2 . . .	50	1	100	00
31	To Profit and Loss gained .		4	10	00
		50		110	00

Notes Receivable Dr.

1826				
Jan. 1	To Stock for James Lamos' on demand	1	40	00
3	To Flour for William Richards' "	1	70	00
10	To Flour for Charles Dutton's "	1	65	00
			175	00

Dr. **Charles Hampden**

1826				
Jan. 1	To Stock	1	25	00
			25	00

Notes Payable Dr.

1826				
Jan. 5	To Sundries to Simon Hill . .		30	00
31	To Balance to Charles Dutton .	4	300	00
			330	00

Dr. **Reuben Bradley**

1826				
Jan. 4	To Cash	1	20	00

Contra **Cr.**

1826		qtls.	Dr.		
Jan. 8	By Adventure to Albany at $2,50	20	3	50	00
31	By Balance . . . 2,00	30	4	60	00
		50		110	00

Contra **Cr.**

1826				
Jan. 9	By Sundries—James Lamos'		40	00
23	By Schooner Caroline—Charles Dutton's	3	65	00
31	By Balance—William Richards' .	4	70	00
			175	00

Northampton **Cr.**

1826				
Jan. 6	By Cash	1	15	00
	By Balance	4	10	00
			25	00

Contra **Cr.**

1826				
Jan. 1	By Stock to Simon Hill . .	1	30	00
23	By Schooner Caroline to Charles Dutton	3	300	00
			330	00

Worcester **Cr.**

1826				
Jan. 1	By Stock	1	20	00

Mackerel — **Dr.**

1826		bbls.	Cr.		
Jan. 2	To Sundries, at $4,50	40		180	00
31	To Profit and Loss, gained		4	20	00
		40		200	00

Dr. — **Adventure to Albany**

1826				
Jan. 8	To Sundries for amount per the Ruby		110	00
31	To Profit and Loss, gained	4	20	00
			130	00

Dr. — **Amos Gilman**

1826				
Jan. 20	To Adventure per the Ruby	3	130	00
			130	00

Bills Receivable — **Dr.**

1826				
Jan. 20	To Amos Gilman for mine to J. Rice	3	100	00

Schooner Caroline, my half — **Dr.**

1826				
Jan. 23	To Sundries for Cost		450	00
28	To Cash for my part of repairs	1	30	00
			480	00

Contra **Cr.**

1826		bbls.	Dr.		
Jan. 8	By Adventure to Albany, at $5,50	10	3	55	00
27	By Cyrus Bates	10	4	55	00
31	By Balance	20	4	90	00
		40		200	00

per the Ruby **Cr.**

1826				
Jan. 20	By Amos Gilman for net proceeds . .	3	130	00
			130	00

Albany **Cr.**

1826				
Jan. 20	By Bills Receivable to James Rice	3	100	00
31	By Balance	4	30	00
			130	00

Contra **Cr.**

1826				
Jan. 20	By Sundries to James Rice on A. Gilman		100	00

Contra **Cr.**

1826				
Jan. 31	By Balance	4	480	00
			480	00

Dr.	Cyrus Bates			
1826		Cr.		
Jan. 27	To Mackerel, 10 bbls. at $5,50 .	3	55	00

Dr.	Charles Dutton			
1826				
Jan. 28	To Cash, paid Repairs on Schr. Caroline	1	30	00

Profit and Loss			Dr.	
1826				
Jan. 9	To Notes Receivable . . .	2	20	00
20	To Bills Receivable . . .	3	1	00
26	To Cash	1	5	00
30	To ditto	1	20	00
31	To Stock for Net Gain . .	1	80	00
			132	00

Balance			Dr.	
1826				
Jan. 31	To Cash	1	318	00
	To Flour, for 6 bbls. at $5,50 .	1	33	00
	To Fish, for 30 qtls. at $2 . .	2	60	00
	To Notes Receivable for Wm. Richards'	2	70	00
	To Charles Hampden . .	2	10	00
	To Mackerel 20 bbls. at $4,50 .	3	90	00
	To Amos Gilman	3	30	00
	To Schooner Caroline, my half .	3	480	00
	To Cyrus Bates	4	55	00
	To Charles Dutton . . .	4	30	00
			1176	00

Concord			Cr.
1826		Dr.	
Jan. 31	By Balance	4	55 00

Plymouth			Cr.
1826			
Jan. 31	By Balance	4	30 00

Contra			Cr.
1826			
Jan. 24	By Cash	1	50 00
31	By Flour	1	32 00
	By Fish	2	10 00
	By Mackerel	3	20 00
	By Adventure to Albany . .	3	20 00
			132 00

Contra			Cr.
1826			
Jan. 31	By Notes Payable to Charles Dutton	2	300 00
	By Stock for net of my estate .	1	876 00
			1176 00

TRIAL BALANCE.

Dr.		Cr.
$ 55	Stock	$845
584	Cash	266
330	Flour	329
100	Fish	50
175	Notes Receivable	105
25	Charles Hampden	15
30	Notes Payable	330
..	Reuben Bradley*	..
180	Mackerel	110
110	Adventure to Albany	130
130	Amos Gilman	100
..	Bills Receivable	..
46	Profit and Loss	50
480	Schooner Caroline	..
55	Cyrus Bates	..
30	Charles Dutton	..
2330		2330

Rules for Journalizing, Posting and Balancing, by way of question and answer.

Q. 1. How many kinds of accounts are there? or, how are Accounts classed?

A. Three; Real, Personal, and Imaginary.

Q. 2. What is a Real Account?

A. An Account of Merchandize, or any other kind of property.

Q. 3. What is a Personal Account?

A. An Account of a person with whom I have some Commercial relation.

Q. 4. What is an Imaginary Account?

A. A form used by merchants for more plainly methodizing their accounts.

Q. 5. Which are the Imaginary Accounts?

A. Stock, Profit and Loss, Balance, &c.

Q. 6. As Stock represents the merchant, or owner of the books, is it not then a reality?

* The Dr. and Cr. being alike, both are omitted.

A. The substance of the account is so, but the title is imaginary by universal custom.

Q. 7. What goes to the debit of a real account?

A. The number or quantity of that kind, with its cost and every charge or expense attending it.

Q. 8. What goes to the credit of a real account?

A. What part I sell and the proceeds of it, or any profit or income arising from it.

Q. 9. When is a personal account debited?

A. When he becomes accountable to me for any sum.

Q. 10. When is a personal account credited?

A. When I become accountable to him for any sum.

Q. 11. What is the debtor to be used in shipping goods?

A. When the shipper's goods are on freight, &c. or in a chartered vessel, the Title is *Adventure*, but when he ships merchandize in his own vessel, the Title is *Voyage*. When goods are shipped on commission, the employer is to be charged with cost, &c.

Q. 12. What goes to the debit of Profit and Loss?

A. What I lose.

Q. 13. What goes to its credit?

A. What I gain.

Q. 14. Is Profit and Loss never debited but when you lose, or credited, but when you gain?

A. In order to transfer the gain or loss to the account of stock when closing the books, it is then necessary to debit it when I gain, and credit it when I lose.

Q. 15. When there is an accession of money or other property to your stock, for which you are to make no equivalent—do you credit Profit and Loss?

A. Money acquired or expended by a merchant in the line of his business, without any direct equivalent, must be carried to the account of Profit and Loss. But legacies and donations go to the stock account, otherwise the books do not give a fair representation of the business.

Q. 16. How do you distinguish between the terms *Cash Account* and *Cash Book?*

A. As in business, many articles will necessarily fall to the Cash account, by which it would soon be filled: Merchants keep a distinct book for it, called the Cash Book. In which the several receipts and payments are daily entered, as they happen, and thence generally once a month regularly post-

ed, making but one line on each side, in the Cash Account in the Leger.

Q. 17. What is meant by the term *Petty Leger?*

A. As in almost every business, it may be necessary to debit or credit certain persons, for comparatively small sums, and by carrying these to the *Leger*, it would soon be filled. It is found convenient to keep a *distinct* book for such purpose, and this is termed the *Petty Leger.*

Q. 18. What goes to the debit of Balance?

A. What ready money I have on hand, my effects at home or abroad, and the debts due to me.

Q. 19. What goes to its credit?

A. What I owe when balancing my books.

Q. 20. What goes to the debit of stock?

A. The amount of the debts which the merchant owes when the books are opened.

Q. 21. What goes to its credit?

A. The amount of cash, goods, debts, and any other property then belonging to him.

Q. 22. Where is the stock account to be placed?

A. On the first page of the Leger.

Q. 23. How do you balance a personal account, when he owes you?

A. I make balance debtor to him for the amount due, and credit him by balance for the same.

Q. 24. When you owe him?

A. I make him debtor to balance for the amount due to him, and credit balance by him for the same.

Q. 25. How do you balance a real account?

A. A real account is balanced by Profit and Loss, Balance, or both, as the case may be.

1st. By Profit and Loss, when the whole of the article is sold to a gain or loss.

If to a gain, the account is made debtor to Profit and Loss for the gain, and Profit and Loss is credited for the same, and the reverse when there is a loss.

2d. By Balance, when the whole of the article remains on hand. Then Balance is made debtor to the article for the part, number, or quantity on hand, and its whole cost, and the account is credited for the same.

3d. By both Balance and Profit and Loss. When a part of the article is sold to gain or loss, this part is balanced as in the first case, and the remaining part is balanced as in the second.

Q. 26. How is a real account closed by a double balance?

A. Balance is made debtor for amount of the debtor side of the account, and the account is credited by balance for the same, and then the account is made debtor to Balance for amount of the credit side and Balance account is credited for the same.

Q. 27. What is the use of a double balance?

A. A real account, closed by a single balance will shew only the part remaining on hand and its proportional cost in the new books, but when closed by a double balance, the debit and credit sides of the account will appear in the new account as they did in the old.

Q. 28. You have now balanced the real and personal accounts; what is next to be done?

A. To ascertain the gain or loss from the account of Profit and Loss, and transfer it in the usual way to the Stock account; and as the Dr. side of the Balance account contains the money and goods, &c. on hand, and the debts due to me; and on the credit side it contains what debts I owe; the difference between them is the net of my estate, which, on being transferred to its place in the account of Stock, will make both sides equal, if the books be correct, and by the balancing of these three accounts is meant by accountants-closing the books.

Q. 29. Will you state more particularly what you ascertain by balancing the accounts and closing the books?

A. From the personal accounts I ascertain what there is due to or from each person. From the real accounts respectively, the part or quantity on hand, and the cost and charge attending it. The Profit and Loss account shows the *several* gains and losses; the balance account gives a collected view of the several branches of the business, and thence I readily see my net stock; and when the difference between the debit and credit of balance is transferred to the Stock account, it shews the present state of the business, contrasted with its state when the books were opened.

Q. 30. May not the gain or loss be ascertained without an account for that purpose?

A. The difference between the net Stock at the beginning, taken from the Stock account, and the net Stock at closing, taken from the balance sheet or account, is the gain or loss, but it is of importance to know the particulars.

Q. 31. Would you proceed thus at the end of each year?

A. Yes; if a new set of books was to be opened, or the business discontinued, but if the business is still going on in the same set of Books, and the balances taken only to know the state of the business, I would carry the balances to a balance sheet, which I would transcribe at the end of the journal, and leave the books open.

Q. 32. Would you always value the property at cost, when closing?

A. If, as before observed, the business is to be continued without any change in the firm, as some goods may be higher, and some lower than when purchased, I would generally value them at the cost. But if there is to be a change in the firm, or circumstances require it, I would rate the property at the actual value; and in order to make a true estimate of Profit and Loss, I would charge interest on all property as well as on debts.

Q. 33. You have closed the sales of goods received on consignment, how would you state the Journal Entry?

A. I would ascertain the several expenses from the subsidiary books, find the commission, and Del credere or guaranty, if any, deduct these with the amount already charged for freight, &c. from the Sales, and then say—

Sales of Merchandize, &c. *or* Sales No. —— } Dr. to Sundries.

To Charges on Merchandize for Storage, &c. &c. . $
To Commission on $ at per cent. . . .
To A. B. for net proceeds to his credit . . . .

But if the goods were sold on credit, and not guarantied,
To A. B. for net proceeds, when collected . . .

Q. 34. Would you include the Guarantee in the Commission account?

A. As Guarantee or Del credere, which is the insurance of personal debts, is a real adventure, it ought to be distinctly recorded, instead of being entered with the commission, as is usually done.

Q. 35. Mr. D—n, of London advises you that he has received from Antwerp, a bill of £750 sterling, $\frac{3}{4}$ths of it belonging to you, and $\frac{1}{4}$th to B. but the *whole* at maturity to *your* disposal: How would you state it?

A. Mr. D—n, or the proceeds of the bill, if realized, would be the Dr. and B will be Cr. for his part, the Cr. for my part is to be ascertained from what has produced it.

Q. 36. Suppose A. and B. each possessing $2000 in cash, agree to take a store to trade in partnership, and give you the charge of their books, how would you state the business?

A. I would make Cash Dr. to Stock for $4000, and then make Stock to A. for $2,000.
" " B. " 2,000.

As the business proceeds, I would make Merchandize Dr. for cost of the goods, and also for all expenses attending the business.—And Cr. Merchandize* for the amount of the Sales, keeping a particular account of the cash sales of each day, to be transferred to the Journal at stated times. Make the Bank Dr. for deposits, and Cr. it for the checks drawn on it.—Charge the partners for what they have from the store, keeping their accounts as individuals, separate from the partnership accounts. And in proper time, on taking an inventory of the goods in the store, to know the amount of the stock on hand, I would balance the books on a separate sheet in the usual manner, to ascertain the gain or loss by the business.

Q. 37. Suppose that on examining their books at the end of six months, A. and B. find the cash on hand to be $3900, and that the debts, both active and passive, are discharged, except $150 due from *each* of the partners, on his private account, and that with a view to close the business, they sell the remainder of their stock at auction for $700 in cash, and then divide the whole. Admitting the Cr. of Merchandize to exceed the Dr. by $900, giving that sum for the net gain, how would you make the closing statements—omitting the Profit and Loss account?

A. I would make Merchandize Dr. to each of the partnership accounts for their shares of the gain, and charge them with the sums due on their private accounts. Charge the partnership accounts with the cash paid on dividing, when they would respectively show on the Cr. $2450 for the Stock advanced, and gain by trade—and on the Dr. $2450 for the cash paid on closing, and the transfer from the private account. And thus, the Merchandize, Cash, private and partnership accounts, would be severally closed.

* This is the term used in Retail business, where the minuteness of the sales forbids the record of their quantities.

Questions in which the materials or Waste-Books' Entries are given to be formed into accounts, designed to teach Book-Keeping on the plan that has so long been successfully used in Arithmetic.

WASTE BOOK.

No. 1.

Jan. 1	I have in Cash, ...	100	00
2	Bought for Cash 8 bbls. of Flour at $6,50	52	00
4	Sold William Baker on account 2 bbls. of Flour at $7,50	15	00
5	Sold James Jones for cash 4 bbls. of Flour at $7,50	30	00

It is required to journalize and post these cases, make a trial balance, balance the accounts, and close the Leger, and from the balance account form an inventory for a new set of books.*

Result of the Statements, viz.

I have in Cash		$78,00
2 bbls. of Flour at $6,50 . .		13,00
William Baker owes . . .		15,00
	Net Stock	106,00
	Net Gain	$6,00

* We should always keep in view a rule of the greatest importa in teaching, that the advances in a difficult art cannot be too and gradual. *Walke*

No. 2.

Jan. 10	I have in Cash	120 00
12	Bought of William Rice for Cash, 30 quintals of Fish, at $2,25 . . .	67 50
14	Sold David Steele 10 quintals of fish, at $2,75 and received his note on demand	27 50
18	Sold Hiram Flint on account 6 quintals of Fish, at $2 75	16 50
20	Received in Cash from Hiram Flint on account, ten dollars	10 00
25	Sold Amos Gilman for Cash 8 quintals of Fish, at $2,75	22 00

Required the Result.

I have in Cash	$84,50
6 quintals Fish, at $2,25 . . .	13,50
David Steele's note for . . .	27,50
Hiram Flint owes	6,50
Net Stock	132,00
Net Gain	$12,00

No. 3.

Feb. 1	I have on hand 20 bbls. Flour at $5,00	100 00
4	Sold William Lamos on acc't 4 bbls. of Flour at $5,50	22 00
6	Sold Richard Mott for cash 5 bbls. of Flour at $5,50	27 50
8	Sold Thomas Duff 3 bbls. of Flour at $5,50 and received his note on demand .	16 50

Feb. 10	Bartered with Simon Gale 3 bbls. of Flour for $6, for 2 bbls. of Beef at $9 .	18	00
12	Received from William Lamos on acc't fifteen dollars	15	00
15	Paid for taxes, &c.	3	50

Result.

I have in Cash	$39,00
5 bbls. Flour at $5	25,00
2 bbls. of Beef at $9 . . .	18,00
Thomas Duff's note for . . .	16,50
William Lamos owes . . .	7,00
Net Stock	$105,50
Net Gain	$5,50

No. 4.

Mar. 1	I have in Cash sixty dollars . .	60	00
2	Bought for Cash 5 bbls. of Flour at $4,50	22	50
3	Sold for Cash 2 bbls. of Flour at $6,00	12	00
5	Sold William Coin 2 bbls. of Flour on acc't at $6,00	12	00
7	Received from William Coin in cash on account eight dollars . . .	8	00
8	Paid for Rates two dollars fifty cents .	2	50
10	Bought for Cash 4 bbls. of Beef at $9,50	38	00
12	Sold for Cash 3 bbls. of Beef at $10,50	31	5
15	Lent Reuben White on his note twenty dols.	20	C

Result of No. 4.

In Cash	$28,50
1 bbl. of Flour	4,50
1 " " Beef	9,50
Reuben White's note for . . .	20,00
William Coin owes	4,00
Net Stock	$66,50
Net Gain	$6,50

No. 5.

Jan. 1	I have in Cash . . . 200,00		
	12 pieces of Linen at $20 . 240,00		
		440	00
3	Sold for Cash 2 pieces of Linen at $24	48	00
4	Sold Thomas Abram on account 3 pieces of Linen at $25	75	00
8	Sold Joseph Hampton 3 pieces of Linen at $25 and received his note on demand	75	00
10	Bartered with Samuel Wilton 2 pieces of Linen at $26, for 10 bbls. of Flour at $5,20	52	00
12	Paid Rates and Postage . . .	2	75
15	Received from Thomas Abram on account	45	00
16	Paid Sundry expenses	1	50

Result of No. 5.

I have in Cash	$288,75
2 pieces of Linen at $20 . . .	40,00
Joseph Hampton's note for . .	75,00
10 bbls. of Flour at $5,20 . .	52,00
Thomas Abram owes me . . .	30,00
Net Stock	$485,75
Net Gain	$45,75

No. 6.

Jan. 15	I have in Cash . . . $250,00 James Lawson owes me on acc't 75,00	325	00
"	I am indebted on acc't to Darius Merrill	30	00
16	Bought of James Joy on acc't 40 yds. Cloth at $4,00	160	00
19	Sold Moses Sands on acc't 10 yds. of Cloth at $4,50	45	00
20	Bought of Richard Holland 5 bbls. of Beef at $9,50, and gave him my note at 10 days	47	50
25	Paid James Joy per receipt . .	80	00
26	Received from Moses Sands on account	25	00
"	Sold James Rose for cash 20 yards Cloth at $4,50	90	00
27	Paid a wager of	5	00
28	Received for a wager of . . .	3	0(
30	Paid rent and taxes	5	7(

Result of No. 6.

I have in Cash	$277,25
10 yds. of Broadcloth at $4 . .	40,00
5 bbls. of Beef at 9,50 .	47,50
James Lawson owes me on acc't .	75,00
Moses Sands do. do. . .	20,00
	$459,75

I am indebted to	James Joy on acc't	$80,00		
" "	Darius Merrill "	30,00		
" "	Richard Holland on note	47,50		
			157,50	
		Net Stock	$302,25	
		Net Gain	$7,25	

No. 7.

Jan. 1	I have in Cash . . . $120,00		
	50 hhds. of Salt at $4 . . 200,00		
	20 bbls. Beef at $9 . . . 180,00		
	James Booth owes me on account 26,00		
		526	00
"	I am indebted, viz.		
	To William Barnes on acc't . 25,00		
	To Arthur Davis on my note . 37,00		
		62	00
2	Sold James Green for Cash 10 hhds. of Salt at $4,50	45	00
3	Sold Richard Payton on his note at 30 days 5 bbls. of Beef at $9,60 . .	48	00
4	Received from James Booth, on acc't	12	00
8	Paid William Barnes on acc't . .	15	00

10	Paid for Sundry expenses . .		7 50
15	Paid William Barnes in full . .		10 00
16	Received from James Booth in full .		14 00
17	Sold James Hammond 10 hhds. Salt at $4,50 and received in part twenty dollars		20 00
25	Bought of David Smith 10 bbls. of Flour at $5,00, and paid him, viz.		
	3 bbls, of Beef at $9,50 . .	28,50	
	Remainder in Cash . . .	21,50	
			50 00
26	Paid my Subscription to the Reading Room		5 00
28	Sold for Cash 10 hhds. of Salt at $4,50		45 00

Result of No. 7.

I have in Cash	197,00
20 hhds Salt at $4,00	80,00
12 bbls. Beef " 9,00	108,00
10 do. Flour " 5,00	50,00
Thomas Hammond owes me on acc't .	25,00
Richard Payton on his note . . .	48,00
	$508,00
I owe to Arthur Davis on my note	37,00
Net Stock	471,00
Net Gain	7,00

No. 8.

Jan. 1	I have in Cash . . .	$153,00	
	5 bbls. of Flour at $6,50 . .	32,50	
	2 " " Beef " 9,50 . .	19,00	
	John Steele's note for . .	28,00	
	David Winter owes me on acc't	20,00	
			252

Jan. 1	I owe Richard Gilman on my note .	40	00
2	Bought of Benjamin Bates 10 quintals of Fish at 3,00 Paid him in Cash . . . $10,00 My note on demand for balance . 20,00	30	00
4	Sold Edmund Blake for Cash 5 quintals of Fish at $3,50	17	50
7	Sold Simon Chambers on his note on demand 5 bbls. Flour at $7,50 . . $37,50 2 " Beef " 9,00 . . 18,00	55	50
10	Taken up my note to Richard Gilman, viz. Paid for principal . . . $40,00 " " 5 months' interest . 1,00	41	00
12	Bought of William Deal on my note on demand, 12 bbls. of Oil at $8,00 .	96	00
13	Received payment of John Steele's note, viz. For principal . . . . $28,00 For 6 months' interest . . 84	28	84
15	Sold Thomas Gale on his note on demand 6 bbls. of Oil at $9,00 . . .	54	00
16	Lent James Mace on his note on demand	30	00
"	David Winter has failed and compounded with his creditors, paying 60 per cent. I have signed the discharge and received	12	00
25	Paid for rent and taxes . . .	5	00

Result of No. 8.

I have in Cash	$125,34
5 qtls. of Fish at $3 . . .	15,00
6 bbls. of Oil at $8 . . .	48,00
John Chambers' note for . .	55,50
Thomas Gale's " " . .	54,00
John Mace's " " . .	30,00
	327,84

I owe as follows,

To Benjamin Bates on my note	$20,00	
To William Deal " " "	96,00	
		116,00
Net Stock now		211,34
" " at beginning		212,50
The result is a loss of		,66

No. 9.

Jan. 1	Innventory of Money, Goods, and Debts belonging to me A. B. and also of what I owe.		
	I have in Cash . . .	$125,34	
	75 quintals Fish at $3 . .	225,00	
	50 bbs. No. 1 Mackerel at $4,75	237,50	
	William Chulmley's note on demand	30,00	
	Peter Bonham's " "	55,50	
	James Ashworth owes me on account	54,00	
			727 34
1	I owe as follows		
	To William Lamos on my Note due on demand	96,00	
	To Henry Panton on account .	20,00	
			116
4	Received a legacy of . . .		50

Jan. 5	Paid William Lamos and endorsed on my note	50	00
7	Received from William Chulmley and endorsed on his note . . .	20	00
8	Received for relinquishing my purchase of the Schooner Jane at Auction .	50	00
10	Shipped on board the Caroline, A. Hillman, for Albany, consigned to Thomas Pemberton on my account and risk, viz. 60 quintals Fish at $3,25 . $195,00 Paid Sundry Charges at Shipping 15,00	210	00
11	Shipped on board the Jane, Charles Adams, for Philadelphia, by order and for account of Wilson & Vanelli, viz. 40 bbls. No. 1 Mackerel at $5 $200,00 Paid Charges at Shipping . . 10,00	210	00
13	Transferred by order of Henry Panton, ten dollars from his account to the credit of James Ashworth	10	00
14	Having agreed with the B. H. Insurance Company on a Policy of Insurance of Shipments per Caroline and Jane, I have given my note for the premium, viz. To cover $210, for Wilson & Vanelli, at 3 per cent. . . . . $6,49 To cover $210 for self at 3 per cent. 6,49	12	98
17	Transferred by desire of William Lamos to the use of Peter Bonham and endorsed on their respective notes . .	30	00

Jan. 20	Received per the Dispatch, Stanley, from Philadelphia, 60 bbls. Flour shipped by James Allison by my order and on my account,		
	Amount per Invoice . .	$277,15	
	Paid Freight, &c. at receiving	20,85	
			298 00
23	Received per the Volant, Seymour, from Baltimore, 40 bbls. Flour, consigned to me by David Aveline on his account.		
	Paid Freight, &c. at receiving . .		20 15
24	Sold Andrew Wood for Cash, viz.		
	20 bbls. of David Aveline's Flour at $6,25	$125	
	20 bbls. of my own, at $6,25 .	125	
			250 00
26	Paid James Allison's draft at sight for Flour per the Dispatch		277 15
29	Received on Sale of the remaining 20 bbls. of David Aveline's Flour at Auction		141 00
31	Closed David Aveline's Sales of Flour, viz.		
	Amount of Sales . . .	$266,00	
	Freight, &c. already charged .	20,15	
	Wharfage, Storage, and Advertising	5,85	
	Commission on $266 at 2 per cent.	5,32	
	Net proceeds to his credit .	234,68	
			245 85
Feb. 1	Refunded to Andrew Wood for abatement on Flour sold him Jan. 24, viz.		
	On account of David Aveline .	$5,00	
	On my own account . . .	5,00	
			10 0
2	Accepted David Aveline's bill in favour of Alfred Dunning, payable in three days		234 6

Feb. 3	Received Cash for 31 bbls. of my Flour at auction	195	00
6	Paid for David Aveline's bill . .	234	68
7	Paid my Subscription to the sufferers by fire at A.	20	00
10	Paid my Subscription to the Reading-Room	5	00
11	Received from Thomas Pemberton of Albany his account of sales of fish per the Caroline, the net proceeds being . .	250	00
14	Received from Henry Wanstead of New York, two bills of $500 each, B. B. Bank, to be invested in the purchase of goods for his account at the Ganges' sales. These I have deposited in the B. B. Bank.	1000	00
17	Received per the Louisiana from New-Orleans, 20 bales Cotton, consigned to me by Walter Howard for sale on his account. Paid freight, &c.	44	25
20	Received Cash for my bill of $250, on Thomas Pemberton of Albany, in favour of John Grant, at 2 per cent. discount	245	00
23	Sold William Carlton for Cash, Walter Howard's cotton weighing net 4000 lbs. at 20 cts. per lb.	800	00
24	Closed Walter Howard's sales of Cotton, viz. Amount of Sales . . . $800,00		
	Freight, &c. already charged . 44,25		
	Paid Wharfage, Storage and Advertising 5,75		
	Commission on $800 at 2½ per cent. 20,00		
	Net proceeds to his credit . . 730,00		
		755	75

Mar. 1	Received cash for my bill of $220,90 on Wilson and Vanelli of Philadelphia, for amount per the Jane, in favour of George Rose, drawn by their desire, on sale of which I discounted 2 per cent. which they allow	216	49
2	Having purchased for cash of William Grant at 6 per cent. discount, his bill of $768,91 on Thomas Deane of New-Orleans, in favour of Walter Howard, I have this day forwarded it to him. One per cent. commission being reserved on the purchase, the balance due to him, and which I have paid for a bill, is	722	78
3	Shipped on board the Adeline, James Sidney, for New York, for account of Henry Wanstead, sundry Merchandize purchased by his order at the Ganges' sales, viz. Amount of Goods per bills . $905,75 Charges at Shipping . . 22,25 Commission on $928, at 5 per cent. 46,40 Paid Premium of Insurance to cover the amount at 2 per cent. . 19,88	994	28
	Discharged the whole per checks on B. B. Bank		
4	Paid Henry Panton the balance of his account	10	00
5	Received from James Ashworth the balance of his account	44	00
6	Paid William Lamos the balance due on my note	16	00
7	Received from Peter Bonham the balance due on his note	25	50
8	Received from William Chulmley the balance on his note	10	0
9	Paid for Rent and Taxes	25	7

Result of No. 9.

I have in Cash			$725,52
15 quintals Fish at	$3,00	. .	45,00
10 Barrels Mackerel at	4,75	. .	47,50
9 ditto Flour at	4,96⅔	. .	44,70
David Aveline owes on account		. .	5,00
B. B. Bank, ... per deposit		. .	5,72
			$873,44
I owe, viz.			
To William Wanstead . . .		$5,72	
To B. H. Insurance Company on my note		12,98	
			18,70
Net Stock . .			854,74
Net Gain by *Trade*			213,40

*The cases following are given, not so much as examples for calculation, as to habituate youth to the understanding and arrangement of complicated accounts, by single entry.**

1. G. bought and sold for cash the following lots of Flour, viz. Jan. 1, he bought 50 bbls. at $5,75 per bbl.— On 15th, 20 bbls. at $5,60—On 16th he sold 65 bbls. at $6,25—On 17th he bought 10 bbls. at $6,75—June 5th he bought 16 bbls. at $5,50 and on 19th, 19 bbls. at $6,80—On 5th August he bought 30 bbls. at $6,50, and on 25th he sold 68 bbls. at $6,60.—Sept. 12, he bought 43 bbls. at $5,80, and on 15th. he sold 10 bbls. at $6, and on 18th 30 bbls. at $5,60 —On 5th Oct. he bought 15 bbls. at $6, and on 24th he sold 20 bbls. at $6,12½. How many bbls. has he on hand, and what is his gain or loss, estimating what remains at $6,25 per bbl.?

Ans. 10 bbls.
Gain, $49,45

* For the desolate widow, lost in the perplexities of business, and terrified with her forlorn condition, let him *disentangle complicated accounts*.—AIKIN's Letters to his Son, Art. *Consolation*.

2. On 1st May, B. of —— had of H. of —— 10 bbls. of Flour at $6,75 per bbl. and paid him in part, $25 in cash. On 15th he had of H. 31 galls. of Molasses at 30 cts. and a bbl. at 83 cts.—19th, he delivered to H. 30 qtls. of Fish at $2,50, and took 20 yds. of Baize at 50 cts.—June 3, B. had 250 lbs. of Coffee at 24 cts. and 10 lbs. Chocolate at 25 cts.—July 27, B. brought to H. 4 bbls. of Oil at $10, and on 31st he sent to H. 4 bbls. Salmon, at $10,50, when H. paid his order to J. M. for $12,50 and delivered per his order to D. L. 903 lbs. Sugar at 7 cts.—Sept. 6th, H. paid B's note to G. for Cordage, on which H. was endorser, viz. for principal $65,94, and $1,87 for interest—On 10th B. brought to him 5854 feet of boards at $11,50 per thousand, and 10 bbls. No. 1 Mackerel at $5. A settlement was then made, and he was furnished with his account, and the balance paid in cash. What was the amount, and in whose favour?

Ans. $5,67 in favour of B.

---

3. James and John have lived together 8 years in John's house, the rent of which is stated at $50 per annum. James' bill for supplies is $1546,46 and John's bill $497,24, and he has James' note for $560,80 without interest. Required the balance on stating their *accounts*, and in whose favour.

Ans. $236,19 due to John.

---

4. Two Carpenters, A. and B. who have each an apprentice, engage to finish a piece of work for $630. By agreement between them, A's apprentice is to be allowed 62½ cts. per day, and B's 100 cts. When the work was finished, it appeared that A. worked 120 days, and his apprentice 100. B. worked 96, and his apprentice 135½ days. Supposing that, while doing the work, they received each $210. What is each person's share of the remaining payment, on stating their accounts? Ans. $92,50 due to A. $117,50 due to B.

---

5. A person failing in trade, owed to A. $100, B. $200, C. $400, to D. $350, and his property consisted of

33½	yards	Broadcloth	worth	$5,75	per yard.
57⅜	"	Cassimere	"	2,46	"
136⅞	"	Linen	"	86	"
229¾	"	Flannel	"	38	"
58	lbs.	Tea	"	1,20	per lb.
254	"	Sugar	"	9	"
5	bbls.	Flour	"	5,75	per bbl.

which was assigned for benefit of his creditors. The commission on Sale of the goods, at the appraised value was at 2½ per cent. and the Assignees' bill $43,50. On exhibiting their statement to the creditors and paying the dividends, how much was there paid to each, and how much did he pay on the dollar? Ans. $57,14 to A. / 114,29 to B. / 228,57 to C. / 200,00 to D. } at 57⅐ cts. per dollar of the debt.

6. G. being employed in working for E. at $1,25 per day, takes the following articles, viz.

May 1, he took a barrel of Flour, at $6,75
June 29 " 14 lbs. Sugar, for $1,50
July 17 " 20 yds. Sheeting at 30 cts. per yd.
" 25 " 12 lbs. Butter at 14 cts. per lb.
" 29 " 1 lb. Tea, at 90 cts. per lb.
Aug. 23 he received $20 in cash, per receipt.
Sep. 19 he took 3 yds. Broadcloth at $5 yer yd.

And on presenting his bill for 90 days' work, commencing on the 25th April, and ending Sept. 30, it is thus adjusted. E. gives up G's note dated Jan. 1, for $100, with interest, on which there is an endorsement, dated June 16 following for $60, and the settlement is made on 30th Sept. when G. received his bill and the balance due to him in cash. How much was it? Ans. $17,22.

7. A. and B. are equal owners of the ship Columbus. A. as agent, receives for freight $5089,60 and his bill against the Ship is $5140,80.—B's bill is $429,20. What is the balance on stating an account with each?

Ans. $189,04½ due to B.

8. In order to close a voyage, sundry articles and small stores from the Schooner Sarah, owned equally by A. B. C. and D. were sold at auction and purchased chiefly by the owners, viz. A. $13,36, B. $32,50, C. $63,66, and for Cash, $6,25. It is required to *adjust* this business.

Ans. $28,06¾ due to A. *also* $41,05¼ due from B.
41,44¾ " " D. 22,21¼ " " C
6,25 in Cash.
$69,51½ $69,51½

9. C. D. owner of the Fishing Schooner, Hannah, of 100 tons, agreed with J. P. and 12 fishermen to fit her for the Labrador fishery on shares; the vessel to draw one quarter part of the proceeds, after deducting the *Great General* for salt, boats, seines, nets and candles, which in this case amounted to $850. And of the other three quarters, each man was to receive one thirteenth part, after deducting the *Small General* for provisions and small stores, amounting to $550. They were absent four months, and returned with a cargo of Fish and Oil, viz.

1000 quintals, which sold at 13*s*.	- -	$2166,67
28 barrels Oil, " $12	- -	336,00
Bounty received from Government	- -	360,00

The tonnage bounty is $4 per ton, but in no case to exceed $360.

C. D. also, as owner of the Schooner Mary of 47 tons, agreed with S. C. and five fishermen to fit her for a Mackerel voyage on shares. The owner to draw one quarter of the proceeds, after deducting the *Great General* which amounted to $160. Each man to receive one sixth of the other three quarters, after deducting the *Small General*, which amounted to $52. They were absent 6 weeks, and returned with 125 barrels of Mackerel, viz.

60 Bbls.	No. 1 which sold at	$5,00 -	$300
50 "	No. 2 - -	4,50 -	225
15 "	No. 3 - -	4,00 -	60

Required C. D's share of the proceeds for his vessels and supplies, and the respective shares of the fishermen?

Ans. C. D's part as owner	- -	$609,41 cts.
" " for supplies	- -	1612.00
J. P. & Co. in the Hannah—each		73,80$\frac{1}{13}$
S. C. & Co. " Mary—	"	44,45$\frac{5}{6}$.

---

10. On the 31st December 1825, the Dr. side of A's *account* with B. was $6281,78
And the Cr. side was 6300,00
The Sum of the Dr. of *interest account* with him was 262,06
" " Cr. " " " 296,25
How much is the balance, and in whose favour?
Ans. $52,41 due to

---

11. Three Carpenters, A. B. and C. agree with G. to L. a store and find the materials for $1000, of which 600 w to be paid in advance, and the remainder when the w

was finished. B. and C. take $50 each, of the first payment. When the work was completed, it appeared by A's account, who received the money and paid the bills, for which he was allowed a compensation of $10, that he had paid $648,95, exclusive of the payments to B. and C. and that he had worked 63 days, B. worked 51 days, and he was allowed $20 for the use of his shop, &c. C. worked 60 days, and his bill for boarding the men they hired was $68,75. A. on settling with G. and allowing him $23,15 charged to B. and $17,48 charged to C. receives the balance in Cash, and on exhibiting his *statement* of the business to B. and C. he pays to each the balance due. How much did they make per day, and how was the last payment disposed of?

Ans. $1,45 per day, and B. rec'd $20,80,
C. $88,27, and A. $250,30.

---

12. A. B. and C. agreed on an entertainment, to which some friends were invited. A. and B. supplied the provisions, &c. in 8 baskets of equal cost. Five of which were supplied by A. and three by B. When the entertainment was finished, C. laid down $12,64 for his part, which was to be shared by A. and B. but disagreeing in the division of it, they referred it to D. who awarded to each his part, and proved the justness of his decision by stating it in an account. Required the amount awarded to each.

Ans. $11,06 to A.
1,58 to B.

Paid by C. $12,64

---

13. Four persons, B. C. D. and E. equal owners of the Brig Pilgrim, and cargo, from Havana, agree to take to their own use, 45 hhds. of the Molasses, and 4 hhds. of the Coffee on board, and to account for excess or deficiency in dividing at 30 cts. per gallon for Molasses and 24 cts. per lb. for Coffee.

Contents of the Molasses.				*Weight of the Coffee.*			
hhds.	marks	wants		hhds.		lb.	
12	1329	galls. 72*	to B.	1	wt. net	926	to B.
11	1240	" 66	" C.	1	"	958	" C.
11	1173	" 65	" D.	1	"	899	" D.
11	1163	" 54	" E.	1	"	965	" E.

quired the balance on their respective accounts.

Ans. There is due to D.		$25,32	Due from B.		$25,86
" " E.		9,18	" " C.		8,64
		$34,50			$34,50

* The 12 hhds. wanted 72 gallons of being full.

14. A supercargo invested certain sales in purchasing 1425 bushels of Corn in a southern port, of which

A's sales purchased 630 bushels.
B's " " 342 "
C's " " 216 "
D's " " 105 "
E's " " 132 "

At his return to ——, the owners doubting whether the measure would hold out, agreed that each should take at his option, and adjust for excess or deficiency of his share at 50 cents per bushel,

When A. took 600 bushels.
B. " 300 "
C. " 200 "
D. " 90 "
E. " 100 "

And 59 bushels remaining were sold by the supercargo for $29,50 in Cash. Required the result of his *statement* to the owners.

Ans.	$11,88 due to B.	
	2,24 " C.	
	4,70 " D.	$1,80 due from A.
	12,48 " E.	29,50 in Cash.
	$31,30	$31,30

15. The amount of Invoice of the Cargo of the Schooner Caroline, A. B. Master, for the West Indies, on account and risk of C. D. of B. was $2216,41, and the gross sales at Port-au-Prince were, viz.

96 barrels Mackerel . .	at $5,50
50 boxes Fish	2,50
15 barrels Clear Pork . .	20,00
123 boxes Soap	1,75
117 barrels Flour	13,00
2 do. Alewives . . .	5,50
5 do. do. . . .	5,00
24 kegs Lard Tare $\frac{794}{119}$ 675 lbs. .	,13
12 barrels No. 1 Pork . .	15,00
1 do. do. do. .	15,00
29 boxes Tobacco, 3501 lbs. .	20,00 pe
2 do. do. 254 lbs. .	18,00 pe

Charges.

Paid for Duties, Wharfage, Cooperage, Hospital tax, &c. $672,07.

The Commission on the Sales was at 5 per cent.

Cost of the Return Cargo, viz.

160 bags of Coffee, weighing 22464 lbs. tare 160 lbs. at $10,37½ per cent.

Charges.

Duty $20 per 1000 lbs. W'g and Wharfage $1 per 1000 lbs. Paid for bags at 30cts. per 100 lbs. Permits, Drayage, &c. $44,61 Commission on the whole at 2½ per cent.

Required the advance made on the outward cargo, also the balance on Capt. B's *stating his account* at Port-au-Prince with his owner, and in whose favour.

Ans. $677,74 Advance.
72,14 Due to Capt. B.

---

16. G. H. received per Brig Mentor, Capt. B. on consignment from L. M. of Havana, ten hhds. of Molasses, which were sold per order for cash. Sales, &c. viz.

	Gals.	Wants		Galls.	Wants.
Gauges, No. 1.	112	—15	No. 6.	103	—14
2.	100	— 9	7.	107	—11
3.	98	— 7	8.	99	— 9
4.	101	—10	9.	111	—15
5.	106	—11	10.	98	—10
	517	52		518	59
	518	59		—	—

Gauges
Wants

No. galls. at 30 cents.

Charges.

Freight $30, Wharfage $1, Labour 90 cts. Advertising cts. Auction charges $1,50, Duties 5 cts. per gallon, mmission on sales at 2½ per ct. Required the Net proeds as stated in the *Account of Sales*, forwarded to L. M. of ana,

Ans. $189,92.

17. A. owned $\frac{7}{24}$, B. $\frac{3}{24}$, C. $\frac{8}{24}$, and D. $\frac{6}{24}$, of the Ship Caroline. A. acted as agent in the outfitting of the Ship for Havana, towards which B's bill was $720, C's $1920, and D's $1440. Some days after her departure, A. became bankrupt, and it appeared that there was still due to the creditors of the Ship and Cargo, $7413,84. At a meeting of the owners, C. was appointed to apportion the shares for the deficiency, and also to subdivide the bankrupt's part on them, which they are to make good in consequence of his failure. On C's exhibiting his *statement*, a settlement was made by payments in cash. How much did each pay?

Ans. B. paid $1308,32
C. " 3488,87
D. " 2616,65

$7413,84

---

18. The Brig Susan, employed in the Flour trade, was owned equally by Charles Clinton, of Baltimore, and Richard Payson, of Boston, who, as agent, sold $\frac{1}{8}$ of her to Capt. Hilton for cash, engaging to freight his part at 50 cents per barrel, gave him 3 per cent. privilege and $25 per month as master of her. In this business he made three voyages from Boston to Baltimore, delivering at each time 1000 barrels in Boston. His share of passage money was

On the First voyage $10,20 out, and $8,40 home.
" Second " 9,40 " 7,00 "
" Third " 16,60 " 8,40 "

At the end of five months it appeared by Richard Payson's account, that the disbursements for the Brig amounted to $696,96. The premium of Insurance, effected by him for Capt. Hilton was $20. The small stores remaining on board were sold for $50,24. On settlement the balance in his favour was paid to him in cash, and he was furnished with a copy of the *Brig's Account*, and of his *own* with the c—
The amount paid Capt. Hilton is required.

Ans. $311.

19. A. B. and C. ageee to build a factory, to be concerned each one third. A. to be agent at $1000 per annum, to be paid quarterly. At commencing, each of them pays $1000,

In	3	months	A. pays	$500
"	4	"	C. "	610
"	6	"	B. "	725
"	7	"	C. "	1200
"	9	"	B. "	1675
"	12	"	A. "	1630
"	14	"	B. "	2115
"	17	"	A. "	505
"	24	"	C. "	2983

At which time the Factory is completed. By agreement, interest is to be allowed on the several advances, and as the Agent received nothing for his services during the time, the instalments of his salary are to be considered as advances on his part as they became due. Required the balances as exhibited by the Treasurer's *statement*.

Ans. $64,13$\frac{1}{3}$ due to C.
16,10$\frac{5}{6}$ " " A.

$80,24$\frac{1}{6}$ due from B.

20. A. B. and C. are jointly concerned in trade. At commencing A. advances $1500, B. $2100, and C. $3000. On balancing their books at the end of 12 months, their net stock amounted to $8850. A. stands indebted to the company on his private account $300, and B. 180, and C. is creditor for $480. By their contract, they are allowed interest for their unequal advances of stock, at 6 per cent. and then share the gain equally. Required the share of each in the present stock, as exhibited in their *respective accounts* by the managing partner.

Ans. A. owns $1908
B. " 2664
C. " 4278

$8850 whole stock.

21. Three persons, A. B. and C. agreed to trade in Company with a joint stock of $8957. A's share is $\frac{6}{12}$, B's $\frac{4}{12}$, and C's $\frac{3}{12}$. At the end of a year when they balanced their books, there appeared a loss of $1157. C. being discouraged at the prospect, desires to withdraw from the concern, and the other partners propose to take the risk of recovering the outstanding debts, and pay him his share in the present stock, on being allowed a discount of $17\frac{1}{2}$ per cent. to which C. consents, and he is paid accordingly.—Required the result of this concern, as shown by the *company's books* at closing.

Ans. A. now owns $\frac{3}{5}$, valued at 4491
B. " $\frac{2}{5}$, " 2994

C. receives for his part $1485

---

22. *Estimate* of a voyage for the Ship Washington, from Boston to Batavia, viz.

Suppose the Ship and Appertenances to be worth $16000; Outfits $2600; Specie in dollars $136000; Premium on them to be 2 per cent; Interest on capital for 16 months at 6 per cent. per annum; Coffee to be at $21 per picul in Batavia, and Specie at par, and the whole invested. The disbursements there amounting to $2300, being paid out of the owner's funds in Batavia. Supposing each picul to weigh in the U. States 130 lb. and to sell at 22 cents per lb. and the Ship to be valued at $14000 on her return. What would it leave for expenses and profit? Ans. 20785,60.

---

23. *Estimate* of a voyage of the Ship Clinton of New-York, from Amsterdam to Batavia, and back to Amsterdam, viz.

Capital invested in guilders and merchandize $80000, to yield a gain of $12\frac{1}{2}$ per cent. in Batavia, which sum, besides discharging $1300 for disbursements there, would purchase 3700 piculs of Coffee at $23 per picul, and 600 piculs of Sugar at $6 per picul. Supposing the Coffee to sell in Amsterdam at $30, and the sugar at $9 per picul, what w
be the gain, allowing 7 per cent. for Interest, and 5
cent. for Insurance, and $9000 for all expenses and we
the ship for 12 months. Ans. $178

MERCANTILE PRECEDENTS.

BILL OF EXCHANGE.

Newburyport, Feb. 12, 1804.

EXCHANGE for £1000 sterling.

At twenty days sight of this my first of exchange (second and third of the same tenor and date not paid) pay to John Parker, or order, One Thousand Pounds Sterling, with or without further advice from

Your humble servant,
WILLIAM PRINCE.

Messrs. DUTTON & GREEN,
Merchants,
London.

PROMISSORY NOTE.

Boston, May 5, 1804. For value received, I promise to pay to Simon Simmonds, or order, seventy-eight dollars forty-eight cents, on demand, with interest after two months.

Attest, WILLIAM POOLE.
SAUL JAMES.

A RECEIPT FOR AN ENDORSEMENT ON A NOTE.

Boston, July 12, 1804. Received from Mr. William Poole, (by the hands of Mr. Benjamin Flint,) Thirty-eight dollars seventy cents, which is endorsed on his note of May 5, 1804.

SIMON SIMMONDS.

38 dols. 70 cts.

RECEIPT FOR MONEY RECEIVED ON ACCOUNT.

Boston, January 10, 1804. Received from Mr. D. Evans, (by the hands of Mr. Thomas Dunmore,) Four hundred and thirty dollars on account.

430 dols. GEORGE PACE.

PROMISSORY NOTE BY TWO PERSONS.

Newburyport, 12th July, 1804. For value received we jointly and severally promise to pay to Mr. Samuel Rich, or order, Five hundred dollars fifty-four cents, on demand, with interest.

Attest, NATHAN SAYBORN.
WILLIAM BOLTON. STEPHEN NEEDY.

——, November 15, 1827.

For value received, We the Subscribers, A. B. as principal, and C. D. and E. F. as sureties, promise jointly and severally to pay to G. H. or order Five dollars in sixty-three days with interest after.

A. B.
C. D.
E. F.

GENERAL RECEIPT.

New-Bedford, March 27, 1804. Received from Mr. N. B. the sum of ten dollars twenty-nine cents in full of all demands.

10 dols. 29 cts. E. D.

BANK NOTES.

When a note is offered at a bank for discount, two endorsers are generally required, to the first of whom it is said to be payable: Thus A. having occasion for a sum of money, procures B. and C. as endorsers to his note, and offers it for discount in the following form:

100 Dollars. ——, ——

For value received, I promise to pay B. or order, at the —— Bank, on demand, one hundred dollars, with interest after —— days. A.

When state notes, bank shares, &c. are lodged in a bank as security for moneys, a note is presented in this form:

For value received, I promise to pay the President, Directors and Company of the —— Bank, or their order, said Bank, on demand, —— dollars, with interest after — days. C. D

ACCOUNTS OF SALES.

***SALES** of 20 hhds. 7 bbls. and 31 bags coffee, for and on risk of Mr. William Stillman, merchant in Portland.*

1804.

March 15, William Edes, 20 hhds. wt. 14376 lb. at 23 cts. per lb.	Dols. 3306		
16, George Watts, 7 bbls. wt. 1493 at 23 cts.		343	39
17, Peter Bates, 31 bags, 5507 23		1266	61
		4916	48
Charges,			
Advertising, . . . Dol.	1 46		
Storage, ...	3 50		
Commission on 4916 dols. 48 cts. at 2½ per cent.	122 91	127	87
Neat proceeds passed to his credit *Dols.*		4788	61

Errors excepted, &c.

***SALES** of sundry merchandize received per the ship Juno, Capt. Dane, from Machias, and disposed of for account and risk of Amos Goodwin, merchant there.*

Date.	To whom sold.	quintals fish.	barrels oil.	barrels salmon.	barrels herring.	cords wood.	cords bark.	feet boards.	barrels beef.	Price.	Amount.
1824										*dls. cts.*	*dls. cts.*
June 4	James Yates	30								3	90
8	Wm. Rowe	120								3 27	292 40
27	John Payson		6							12	72
July 4	James Nugent						22			4	88
—	Cash			50						8 75	437 50
8	Sim. Sands							3,216		6 50	20 90
21	Stock								15	9	135
29	Paul Simson					13				3 50	45 50
Aug. 5	Jona. Rose							1,259		6	7 55
	Taken to fill up		1								
		150	7	50		13	22	4,475	15		1288 85

Remaining unsold, 40 barrels of herring.

Charges, viz.

age of fish	*dols.* 10 50		
mission on 1288 dols. 85 cts. at 2½ per cent.	32 22	42	72
eat proceeds carried to the credit of his account, *Dols.*		1246	13

Errors excepted, &c.

SALES of 19 hogsheads and 7 bbls. of rum, received per the schooner Ruby, Richard Butler, master, from Portsmouth, for account and risk of Daniel Edwards, merchant there.

Date.	To whom sold.	19 hhds. Rum.	7 bbls. Rum.	Gallons.	Price.	Contents.	Amount.
1804					*cts.*		*dls. cts.*
May 24	By Walter King		1	29½	100		29 50
June 2	By David Jones	2		216	100	110 and 106	216
20	By James Ray	4		438	96	108,110,111,109	420 48
24	By Aaron Judson		3	81	95	26½, 27½, 27	76 95
July 23	By Tho's Ropes	1		115	95½		109 82
Aug. 3	By Parsons & Ely		1	25	95½		23 87
28	By Simon Sands	2		222	98	109, 113	217 56
Sept. 4	By Miles Young	1	1	138	96	110, 28	132 48
10	By Moses Bliss	3	1	342½	99	107,104,103,28½	339 7
25	By Amos Dundas	6		632	98½	109,102,106 / 111,112, 92	622 52
		19	7	2239			2188 25

Charges.

	dls. cts.	*dls. cts.*
Paid Capt. Butler freight of 19 hhds. rum, at	2 50	47 50
ditto 7 bbls.	66	4 62
Porterage 19 hhds.	40	7 60
ditto 7 bbls.	10	70
Gauging 26 casks	12½	3 25
Cooperage 3 dols. on hhds. 1 dol. 50 cts. on bbls.		4 50
Advertising		1 25
Commission on 2188 dols. 25 cts. at 5 per cent.		109 41
		178 83

Neat proceeds *Dols.* 2009 42

Outstanding in hands of

	dls. cts.
Moses Bliss	339 7
Amos Dundas	622 52

Boston, 25th September, 1804.

Errors excepted, &c.

Dr. *Mr. John Johnson in account current with William Roberts.* *Cr.*

1803		dols.	cts.	1803.		dols.	cts.
May 19.	To cash advanced per receipt . .	300		Oct. 28.	By ship Columbia for hull thereof complete, being 171½ tons, at 16 dols.	2744	
June 5.	To sundries per bill	458	12				
July 25.	To payment of his order to M. B. for .	100					
29.	To 1 bag coffee 96 lb. at 20 cents .	19	20				
* Aug. 1.	To cash per receipt	450					
–	To 5 hhds. rum 555 gals. at 83⅓ cts. .	462	50				
–	To 3 boxes glass 7 by 9, 10 dols. .	30					
Sept. 2.	To sundries per bill	228	56				
–	To cash per receipt	385					
20.	To 12 bbls. flour at 8 dols. 4 bbls. pork at 12	144					
25.	To 1 hhd. sugar 8 cwt. 2 qrs. 7 lb. nt. 10 dols.	85	62				
Oct. 29.	To cash and sundries in full . ,	81					
		dols. 2744				dols. 2744	

Salem, Oct. 28, 1803.

Errors excepted.

WILLIAM ROBERTS.

Dr. *Mr. James Richardson in account current with Thomas Seccome.* *Cr.*

1803.		dols. cts.
June 12.	To sundries per bill	28 26
	To 53 bars Iron, wt. 21 2 10 for schooner William	
July 15.	To 121 do. . 41 2 18 do. do.	
26.	To 1 hhd. W.I.Rum. qt. 107 gals. at 96 cts.	102 72
Aug. 28.	To cash per receipt	180 00
29.	To 4 bbls. flour at 9 dols. 50 cts. .	38 00
Sept. 21.	To cash paid his order to James Wise	28 00
	To cash in full	2 52
		dols. 379 50

1803.		dols. cts.
Oct 12.	By schooner William for blacksmith's work per bill, viz. 6325 lb. at 6 cts. 759 lb. tare at 12 per cent. 7084 lb. supplied per Dr.	379 50
		dols. 379 50

NOTE. *When a person is furnished with his account current, it is necessary to specify the various charges, and when they are numerous, some accountants make but one charge of them in the account current, referring to an annexed account of the several articles thus included.*

Newburyport, 12th Oct. 1803.
Errors excepted.
THOMAS SECCOME.

An Interest Account in Sterling.

August	13.	To	£2648	10	0	for	140	days	. . . . .	Products		370860
September	18.	To	18	1	0	”	104	”	. . . . .	”		1872
October	2.	To	31	19	7	”	90	”	. . . . .	”		2880
”	26.	To	246	17	6	”	66	”	. . . . .	”		16302
November	16.	To	33	0	0	”	45	”	. . . . .	”		1485
												393399
August	**31.**	**By**	**£8**	**0**	**0**	**for**	**122**	**days.**	. . . . .	**Products**	976	
October	**5.**	**By**	**45**	**3**	**9**	”	87	”	. . . . .	”	3915	
November	**10.**	**By**	**305**	**10**	**10**	”	51	”	. . . . .	”	15606	
December	**11.**	**By**	**2436**	**9**	**11**	”	20	”	. . . . .	”	48720	
												69217
										Balance of products		324182

Drs. 393999
Crs. 69217

7300)324182

£44 8 2 Balance of Interest at 5 per cent.
227 11 9 ditto Principal.

Liverpool, Dec. 31st, 1827.

Sales by Auction of 2 bales Woollens received from London by the ship John Adams, John Biddle, Esq. commander, on account of William Sutton of Leith.

						yards.			$	$	cts.
Sept. 7	1	piece	Cloth,	No.	1	13	at	$2 33	30	29	
at 3 mo's.	1	.	.		2	25¾		2 00	51	50	
W. & B	1	.	.		3	23		2 00	46	00	
	1	.	.		4	21½		2 17	47	19	
1 *a* 10	1	.	.		5	23¾		2 79	66	25	
	1	.	.		6	22		2 12	46	64	
	1	.	.		7	19		3 00	57	00	
	1	.	.		8	24		2 21	53	04	
	1	.	.		9	21		3 17	66	57	
	1	.	.		10	24		3 04	72	96	
										537	44
						yards.					
	2	ps.	Cassimere,	No.	11 12	55½	at	$1	55	50	
14th.	2	.	.	.	13 14	54½		99	53	96	
at 3 mo's.	2	.	.	.	15 16	56		94	52	64	
	2	.	.	.	17 18	52		94	48	88	
	2	.	.	.	19 20	54		94	50	76	
	2	.	.	.	21 22	49¾	1	25	62	19	
	2	.	.	.	23 24	53	1	21	64	13	
	2	.	.	.	25 26	47½	1	21	57	47	
	2	.	.	.	27 28	49¾	1	21	60	20	
	2	.	.	.	29 30	46	1	21	55	66	
										561	39
										1098	83

Charges.

Paid freight and primage	7	44
U. S. impost	139	14
Advertising and crying	2	00
Bond and permit	1	40
Wharfage 27 cts. truckage 48 cts.		75
Commission, interest and guar. on $1098 83 at 5 per cent.	54	94
		205 67
Net proceeds		893 16

Boston, Sept 21st.

Invoice of 40 *Bales Cotton, shipped by Samuel Wright on board brig Industry, David King master, bound for Liverpool, for sole account and risk of James Wood, merchant of Boston, and consigned by his order to Messrs. Wright and Sons, merchants, Liverpool.*

T	30 Bales Prime New Orleans Cotton										
1 ad. 30.	No. 1	. .	300	No.	16	. .	304				
	2	. .	293		17	. .	308				
	3	. .	287		18	. .	298				
	4	. .	306		19	. .	279				
	5	. .	308		20	. .	288				
	6	. .	389		21	. .	298				
	7	. .	304		22	. .	299				
	8	. .	301		23	. .	297				
	9	. .	305		24	. .	309				
	10	. .	295		25	. .	307				
	11	. .	284		26	. .	297				
	12	. .	278		27	. .	284				
	13	. .	310		28	. .	282				
	14	. .	315		29	. .	276				
	15	. .	309		30	. .	301				
			4484				4427				
			4427								
			8911								
	Draft ½ p. ct.		45								
			8866 *lb.* at 18 cts.						1595	88	
D	10 Bales ditto ditto.										
1 *a* 10.	No. 1	. .	308	No.	6	. .	301				
	2	. .	307		7	. .	310				
	3	. .	310		8	. .	318				
	4	. .	320		9	. .	315				
	5	. .	310		10	. .	318				
			1555				1562				
			1562								
			3117								
	Draft ½ p. ct.		16								
			3101 *lb.* at 17 cts.						527	17	
											2123 05
	Charges.										
	Draying $6, wharfage $4, mending $2,								12	00	
	Commission 2½ per ct. on $2123 05.								53	07	
	New Orleans, April 25th, 1823.										65 07
	Errors excepted.										
	S. WRIGHT.										2188 12

Freight List of brig Harmony, William Rice, from Boston to New Orleans.

Marks and numbers.	*Packages and Contents.*	*By whom Shipped.*	*To whom Consigned*	*Weight or Measure.*	*Rate of Freight.*	*Amount.*
W S	15 casks Cheese	W S	G K	ton. ft. in.	per cask $1,00	$15 00
1 ad. 15	6 trunks Shoes	&c.	&c.	1 3 8	per ton 8,	8 73
&c.	26 boxes Sperm Candles . .			tons. cwt. qr. lb.	per box ,20	5 20
	250 casks Nails			22 19 0 25	per ton 6,	13 77
	10 rolls Carpeting				whole 10,	10 00
	1 hogshead Bacon . . .				whole 4,	4 00
	3 boxes Calcutta Goods . .			37 ft. 8 in.	per ton 8,	7 52
	1 box of Books			12 0	per ton 8,	2 40
	1 case Saddles and Bridles .			20 8	per ton 8,	4 13
	13 pipes Gin				per pipe 4,	52 00
	45 Boxes Glass				per box ,20	9 00
	10 bundles English Nail Rods			ton. cwt. qr. lb.	per ton 7,	107 60
	9 bundles Germon Steel .			15 7 1 21		
	100 boxes Raisins				per box ,14	14 00
	20 kegs Salmon, 3 kegs Pickles				per keg ,04	2 12
	24 sets Sugar Boxes . . .				per set ,05	
	1 trunk Paper			27 ft. 4 in.	per ton 8,	5 47
	40 coils Rigging				whole 12,	12 00
	30 boxes Soap				per box ,20	6 00
	40 boxes Madeira Wine . .				per box ,60	24 00

45 kegs Butter			whole	7,			
50 boxes Sperm Candles			per box	,20			
15 casks Linseed Oil			per cask	1,25		73	75
5 bbls. HakeOil,33 do. Whale Oil			per bbl.	1,			
2 cases black Silk Hdk'fs.	5 ft.		per ton	8,		1	00
57 trunks and 6 boxes Merchandize			whole	38,		38	00
1 box Looking Glasses							
32 bbls. Mackerel			per bbl.	1,		32	00
1 case containing Piano Forte			case	4,		4	00
78 coils Rigging and 5 doz. Hand Lines	cwt. qrs. lb. 17 3 7		per ton	8,		7	12
51 kegs Tongues and Sounds, 49 kegs Salmon			per keg	,05			
			per cask	1,		19	00
14 casks Cheese	ton. ft. in.						
2 boxes Furniture	1 35 8		per ton	8,		15	13
7 trunks Shoes	24 6		per ton	8,		4	90
7 boxes Furniture	3 3 7		per ton	8,		24	72
1 Long Boat			whole	10,		10	00
					$		
8 Passengers on board the brig at $36, each							

Freight List of the Brig Volant, Capt. Samson, from Boston to Charleston, S. C.

Shippers.	*Consignees.*	*Articles.*	*Marks*	*Rate.*	*Amount.*
E N M &c	D E &c.	30 bbls. Beef	W I ad 30 &c.	45 cts. each	$13 50
		15 hhds. N. E. Rum		hhd. $1,75	35 25
		20 bbls. N. E. Rum		bbls. ,45	
		13 boxes Candles		21⅓ ft. *a* 12½ cts.	2 71
		3 casks and 3 cases Hardware		whole $5,75	5 75
		1 box Domestic Goods		9½ ft *a* 12½ cts.	1 19
		100 half bbls. Beef		at 25 cts. each.	25 00
		8 trunks Shoes		26¾ ft. *a* 12½ cts.	3 35
		2 bbls. Shoes.		at 50 cts. each	1 00
		15 bbls. Beef		50 cts. each	12 50
		20 half bbls. Beef		25 cts. each	
		50 half bbls. do.		25 cts. each	22 00
		190 boxes Herrings		5 cts. each	
		1 box Shoes		4½ ft. *a* 12½ cts.	53
		3 boxes Shoes		37¼ ft *a* 12½ cts.	6 54
		2 boxes Hats		at 6¼ cts.	
		30 boxes Herring			
		100 boxes Candles		138 ft. at 10 cts.	13 80
		240 pieces cast Iron Ware		14*c*. 0 21 at $5, pr.ton at 10 cts.	
		46 bundles Shovels, Spades, &c.			
		1 case, 1 bundle, 3 boxes		18¾ ft. at 12½ cts.	10 62
		120 Griddles		3 cts. each	
		20 boxes Chocolate		66 ft. at 10 cts.	16 20
		1 box Merchandize		at 12½ cts.	
		48 bundles Spades			

26	hammered Stones	Columbus of Boston.	66 6-14 tons per ton $3	19	28
30	bbls. Bread		40 cts.	12	00
1	pr Guns with carriages				
56	iron Shot, 30 lb. Grape				
6	Muskets, 10 bolts Russia and 10 bolts Ravens Duck, 2 boxes Tea, 14 coils Cordage, 35 bbls. Beef				
1	Anchor and Stock, 1 keg lamp Oil		. . . . .	44	33
14	bbls. Rum				
1730	ft. in 79 pieces Plank and Boards				
1	Bed and Bedding				
1	Portable Desk				
1	Top Mast, 4 small Spars				
11	coils Cordage		1 ton at $3,50	3	50
30	bundles Hay—6 tons		at $6		
12	Spars		$2		
11	Poles		1s.	117	83
5600	feet Boards		$5		
400	inches Spars		7 cts.		
7	boxes Hats		82½ ft. at 9d.	10	31
20	casks Raisins		25 cts. each	10	00
20	boxes Figs				
15	casks Cheese		37½ cts. each	5	63
155	reams Paper		5 cts.	7	75
8	boxes and 1 trunk Shoes		21½ ft. a 12½ cts.	2	70
3	cases Silk and 2 do. Cottons		15¼ ft. at 10 cts.	1	53
40	boxes Soap		5 cts.	2	00
11	boxes Weights and Scales		whole	4	50
			Dollars.		